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Peru-47-54. Nets are still made by hand in Peru. Here in Chucuito fishermen of the Italian colony require three days to make a bonitera, which, when dipped in a preservative turns dark brown. A new net factory is being built near the scene of this activity.

BETTER UTILIZATION OF FISHERIES RESOURCES IN LATIN AMERICA[1]

The majority of the Latin-American population is undernourished and in many areas of this region millions of people suffer from malnutrition. It seems paradoxical that a large continent of nearly 21 million square kilometers, traditionally acknowledged as having great potential resources, is not producing sufficient supplies of food. Notwithstanding the evident progress of agriculture and animal husbandry in many Latin-American countries, especially during the past 20 years, the region does not yet produce enough food to support the scattered population of over 150 million; the average population density is only seven inhabitants per square kilometer.

Latin-American dietitians, well aware of the nutrition problems of the region, agree that "about 60 million people in South America live in conditions of constant undernourishment, and that at least a third, that is around 30 million, are really in conditions of chronic inanition" (Castro, 1950). Although 1946 food production in Latin America probably increased by about 13 or 14 percent, and 1947 production increased by 19 or 20 percent over the prewar period, the population also increased by 22.3 percent between 1937 and 1947. Food production has not kept pace with population growth.

The necessity of developing new sources of animal fats and proteins demands better utilization of the food resources available. Fisheries resources in Latin America, despite their high nutritional value and relative abundance, remain underdeveloped. They constitute, therefore, the best opportunity available to compensate for the diminishing returns, owing to erosion and loss of fertility, from land at present under cultivation and to improve the social and economic conditions of an ever-increasing population. Notwithstanding this, fish products have constituted but a minor part of the Latin-American diet up to the present time (Osorio-Tafall, 1947).

In general the caloric content of the diet in Latin America is considerably below the requisite level; its composition is completely unbalanced, with carbohydrates in excess, a low fat content and inadequate amounts of proteins, vitamins, and several essential minerals. Improved utilization of fisheries resources would increase food production and also do much to raise the protein content of the diet in these countries. It would create new industries and new means of improved livelihood for the population.

[1]A revision of the paper presented at FAO's Second Latin-American Regional Meeting on Food and Agricultural Programs and Outlook, Montevideo, Uruguay, December 1950.

Known Resources

Many Latin-American countries have extensive coast lines. Some, like Argentina, face wide continental shelves. Off the coast of Chile and Peru, the cold waters of the Peruvian current provide an ideal environment for a wealth of marine life. The most productive grounds for fisheries in Mexico are the waters around the peninsula of Lower California and those along the northwest mainland coast. The Galapagos fishing grounds in the waters surrounding this Archipelago are among the richest of the American Pacific Coast. In Central Chile, the Talcahuano fishing grounds seem to be the most productive while in the far south the waters around the many islands are known to be rich in marketable crustaceans and mollusks. The marine waters of Venezuela, despite tropical conditions, support large populations of fish, some of them forming a basis for comparatively large-scale fisheries (Fiedler, 1947). On the extensive continental shelf off the Argentine coast, hake and some other edible species are obtainable by trawling. Although these waters are less rich in trawlable fish than might have been expected, it is possible that enough could be taken to support an industry if markets could be found, and problems of preservation and distribution could be overcome (Hart, 1948). The entire coast line of Brazil is one large fishing area which, in addition to the river network, accounts for the largest fish catch in Latin America.

Latin-American fisheries include a wide range of faunistic types and cover, to a large extent, a tropical area (Myers, 1950). The fish fauna of the Panamanian or Pacific American bio-geographic province extends from the Gulf of California to Ecuador ; and that of the West Indian or Caribbean province extends from southern Florida to Bahia (Brazil), and includes the Gulf of Mexico and the Cayman and Caribbean seas. The remaining parts are mainly confined to temperate zones : the temperate west South American or Chilean province with its northern boundary just below the Guayas estuary, at Cape Aguja (Ecuador), and its southern extreme in Chiloé Islands where the Patagonian fish fauna begins ; the temperate east South American or Argentinian province which extends from near Bahia (Brazil) in the north, on latitude 13°S. to as far south as the Valdes Peninsula (Argentina) about latitude 42°S. Finally, there is the southern section of Chile and Argentina, south of 43°S., definitely belonging to the sub-antarctic or Patagonian province, which includes Tierra del Fuego, the coast of Chile northward as far as Chiloé Island on the west, and that of Patagonia as far as the Valdés Peninsula on the east, with the Falkland Islands and the Burdwood Bank. While the marine waters of Latin America and their resources have certain features in common, conditions may differ widely from section to section of the region, especially those of inshore and inland waters. There are distinct types of fisheries involving different species or groups of fish.

Nearly the entire Latin-American area has pelagic species, such as tunas, mackerels, and swordfish, of perhaps world-wide distribution. These valuable species are commercially fished only in a few countries : Mexico, Costa Rica, Ecuador, Peru and Chile. As a matter of fact, the greatest fishery in the waters around Mexico is that

for tuna along the west coast, particularly in the waters surrounding Lower California. The tuna, which are primarily fish of the high seas, are not taken in appreciable amounts by Mexican fishermen; they are mostly caught by fishermen from the United States of America who return with their product to the canneries in San Pedro and San Diego, California. (Lindner, 1947). Costa Rica, with one tuna packing plant, and Peru with several canneries, utilize locally only a small part of the catch of tuna and similar species. A large proportion of the catch is shipped frozen to the United States. The pilchard, abundant along the west coast of Lower California, could lend itself to much greater utilization. At present there are only three canneries in Lower California where production is limited by the low domestic demand, despite the good quality and low prices of the products (Osorio-Tafall, 1948).

Latin America's Share in World Production

The recorded annual catch for all Latin America from 1940 to 1946 averaged 360,000 metric tons; in 1947 it totalled nearly 460,000 tons,

TABLE 1. — LANDINGS IN LATIN-AMERICAN COUNTRIES, PREWAR, AVERAGE FOR 1940-46, AND 1947-49.

Country	Prewar[1]	Average 1940-46	1947	1948	1949
	(.....Metric tons[2].....)				
Argentina	55,300	57,585	65,133	71,197	63,869
Bolivia	700*	700*	750*	800*	900*
Brazil	[3]103,279	118,463	139,733	144,767	152,606
Chile[4]	30,572	42,317	60,071	64,724	76,246
Colombia	1,600*	3,000*	4,500*	5,000*	6,000*
Costa Rica	1,450*	1,500*	2,200*	2,300*	2,500*
Cuba	18,048	12,990	13,500	13,500	13,536*
Dominican Republic	332	436	470	456	500
Ecuador[5]	1,850*	1,850*	2,800*	3,400*	5,000*
El Salvador	100*	200*	400*	400*	400*
Guatemala	135*	150*	200*	200*	250*
Haiti	1,500*	1,500*	1,500*	1,600*	1,800*
Honduras[1]	135*	135*	100*	77	92
Mexico	18,695	36,705*	55,536	49,369	55,000*
Nicaragua	100*	100*	100*	100*	125*
Panama	700*	750*	850*	925*	1,000*
Paraguay	300*	300*	350*	375*	400*
Peru	[3]4,849	22,280	30,778	35,944	45,260
Uruguay	3,642	3,333	3,508	3,460	3,795
Venezuela[6]	21,664	54,554	76,207	92,281	75,449
Total	264,951	358,848	458,686	490,875	504,728

SOURCES : FAO, *Yearbook of Fisheries Statistics* - 1947 and 1948-49, various publications, reports, surveys, communications, etc., from official departments, fisheries investigators, ett.

* FAO estimate.

[1] 1938, unless otherwise indicated.

[2] Landed weight, unless otherwise indicated.

[3] 1939.

[4] Round fresh weight.

[5] These data exclude about 15-20,000 metric tons of tuna and similar species caught annually by U.S. fishermen in Galapagos Islands and shipped directly to California.

[6] Includes the data for the production of salted and canned fish but converted to round fresh weight as the original data for fresh fish exclude the fish destined for salting and canning.

and in 1949 exceeded 500,000 tons (Tables 1 and 2). In short, 20 Latin-American republics with about 135,000 active fishermen, together landed a little more than 500,000 metric tons in 1949. The world production in the postwar years averaged annually about 25,000,000 tons[1]. Consequently, the Latin-American share was only about 2 percent of the world total.

Latin-American statistics on the various phases of the fishing industry are incomplete, fragmentary, and in some cases completely non-existent. It is possible that a large portion of the catch is not recorded and that many of the fishermen listed work only part-time. If we remember that a small country like Iceland with an abundance of fishery resources and with about 6,300 fisherman produced nearly 500,000 tons in the same year (1947), then we realize what might be done in Latin America by developing its large potential of fishery resources through the use of modern equipment, better boats and more efficient methods (Jul, 1950).

TABLE 2. — COMPARISON OF PRODUCTION, NUMBER OF FISHERMEN, FISHING CRAFT, ETC,. IN NINE LATIN-AMERICAN COUNTRIES [1].

Country	Year	Production in metric tons	Number of fishermen[2]	Production per fisherman per year in metric tons	Number of powered craft	Total number of craft
Argentina	1947	65,133	7,500	8.7	[3]4,000	[3]350
Brazil	1948	144,767	67,911	2.1	[3]11,000	309
Chile	1949	76,246	7,655	10.0	4,272	959
Cuba	1947	13,500	7,993	1.7	2,509	708
Ecuador	1949	5,000	2,895	1.7	1,750	4
Mexico	1947	55,536	15,000	3.7	5,698	1,767
Peru	1949	45,260	7,669	5.9	3,234	527
Uruguay	1949	3,795	400	9.5	[3]150	[3]44
Venezuela	1949	75,449	19,500	3.9	4,250	150
Total		484,686	136,523	[4]3.6	36,863	4,818

SOURCES : Official publications, communications, etc.

[1] These nine countries account for about 97 percent of the Latin-American catch.

[2] An attempt has been made to exclude fishermen who fish for subsistence only. Figures probably include a large number of part-time fishermen.

[3] Estimate.

[4] Average.

Recent Developments

Interest in developing Latin-American fisheries resources is of fairly recent origin. Rapid progress is being made in some of the large countries in the form of increased catches, the establishment of many new fish canning, freezing and drying, salting and smoking companies, and in the development of shark liver oil, fish meal and oil production and the utilization of other fish by-products.

The recent yearly average catch of fish and shellfish in all Latin-American countries has been about 450,000 tons. Roughly, 285,000 tons of fish are marketed fresh with small amounts frozen ; 40,000 tons

[1] FAO, *Yearbook of Fisheries Statistics* - 1948-49.

are canned and 71,000 are salted and dried; 18,000 tons are used for by-products. The production of crustaceans and mollusks amounts to 30,000 tons.

Several Latin-American countries show an important increase in the output of their marine fisheries. In *Brazil* and *Argentina*, where fresh-water fisheries are also being developed to a large extent, the total catch has increased in spite of the serious difficulties confronting fish consumption in those countries. *Brazil's* fish production increased 40 percent from about 103,000 tons before the war to 145,000 tons in 1949; *Argentina* raised her catch 18 percent, from 55,000 tons to 65,000 tons. During the same period, the production in *Chile* increased relatively much more, from 36,500 tons to 76,250 tons, or about 109 percent. This was partially due to the meat shortage and also to encouragement by both Government agencies and the industry. Private investments in *Mexico* resulted in an increase from 18,500 tons to 55,500 tons or nearly 200 percent. Even greater gains were attained in *Venezuela* where production rose from 21,600 tons before the war to 75,500 tons in 1949, amounting to 250 percent. In *Peru* the increase was from 5,000 to 45,000 tons, or 800 percent, due partly to greatly increased exports and also because of a considerable increase in domestic consumption. Production increases have been due largely to the demands of the processing industry rather than of the fresh fish market. Some other countries, *Ecuador* and *Costa Rica* for instance, have experienced notable increases in their fish production but the bulk of the catch was frozen and exported for canning abroad (Jul, 1949).

Brazil, *Chile*, *Venezuela*, *Argentina*, *Mexico*, and *Peru*, in this order, account for 92.7 percent of the catch. These countries process nearly all the canned and cured fish produced in Latin America. Consumption, however, has not increased in the same proportion in the countries concerned because of sharp curtailment in imports due to financial difficulties and a growing export trade in the larger producing countries. While great progress in the establishment of processing industries has been made in Latin America during the past ten years, further possibilities for development undoubtedly exist. On the west coast of *Mexico* there are 13 shrimp plants with a daily freezing capacity of nearly 150 tons. Several other plants are projected and will be built in the immediate future, closer to the newly developed fishing grounds. In *Mexico*, where about 33 percent of the catch of edible species is used by the canneries, the 1946 production of canned fish products was about 13,500 tons. Most of the production is canned sardine and mackerel from a group of plants on the west coast of *Lower California*.

During and after World War II, *Venezuela* developed an important sardine canning industry. At present seven canneries are in operation, all of which are located along the south shore of the Gulf of Cariaco. The Venezuelan production of canned fish was about 9,300 tons in 1948 but the loss of foreign markets, due to high production costs and competition from foreign products, and the subsequent curtailment of canning activities lowered the production in 1949 to an estimated 7,700 tons.

In *Peru*, where there are more than 25 plants engaged in canning bonito and tuna, the 1949 output of canned fish (bonito and tuna) is estimated at 555,000 cases (6,665 tons), with the bulk of production being exported to the United States.

Fish have been processed in *Chile* for many years but on a limited scale. During the past decade, however, considerable activity has taken place. In 1946, there were 56 canneries which produced a pack of 251,000 (2,750 tons) standard cases of canned fish, chiefly sardine, tuna, and herring. Shellfish, principally mussels, amounted to about 88,000 cases (approximately 1,000 tons).

In *Argentina*, the demand for canned fishery products is being met by increased local production of mackerel, packed tuna style, and anchovy packed sardine style. Mar del Plata, the center of the industry, has about 90 plants for salting and canning fish.

Among the problems confronted by the Latin-American fish processing industry are the difficulty of obtaining equipment to replace obsolete machinery, the lack of adequate reserves for operating expenses, the difficulty in many countries of acquiring dollars for tin plate, and the low standard of the cans manufactured locally. In addition, the problems of sanitary regulations for inspection and control of exported processed fish products are very difficult to solve because of the quantities and diversified products manufactured.

Utilization of by-products is beginning in several Latin-American countries. For example, *Argentina* has a fresh-water fishery which produces about 15,000 tons yearly, over half of which is *sábalo* (*Prochilodus platensis*). Almost all of the *sábalo* is processed for oil and meal. *Chile*, *Peru*, *Venezuela*, and *Mexico* have also developed a fish meal and oil industry. In recent years, due to the drop in price of shark liver oil in the United States, there has been a great decline in the shark fishery. This fishery, during World War II and early postwar years, was very important in *Argentina*, *Chile* and *Mexico*.

Imports to and Exports from the Latin-American Region

Latin-American imports of fisheries products have decreased during the last 20 years in spite of the corresponding 20 percent increase in population. In recent years the increased difficulty in obtaining hard currencies, and rigid government exchange controls, account largely for this decrease. For example, *Argentina's* imports of canned fish amounted to 3,730 tons in 1937 but have been almost nil since 1948. Venezuela is perhaps the only exception. The combination of a relatively high dollar income (from the petroleum industry), low taxes, and dependence on imported food products makes Venezuela one of the most important Latin-American outlets for processed fishery products. In 1949, Venezuelan imports of fishery products totalled around 1,500 tons, of which about 1,000 tons were U.S. exports valued at $ 1,031,200, sardines being the number one item. Peculiarly enough, sardines occupy the first place in the canned fish products exported by *Venezuela* (Smith, 1950). With export difficulties increasing, the Venezuelan fish canning industry has recently requested that the Go-

TABLE 3. — IMPORTS INTO THE UNITED STATES OF AMERICA OF SELECTED FISHERIES PRODUCTS FROM LATIN-AMERICAN COUNTRIES IN 1950.

Country of origin	Frozen tuna	Canned tuna	Canned bonito	Fresh and frozen shrimp
	(.....Metric tons.....)			
Canal Zone	2,678	—	—	—
Costa Rica	4,364	—	—	—
Ecuador	441	—	—	—
Mexico	23	—	—	17,986
Peru	6,013	1,037	3,646	—
Total	13,519	1,037	3,646	17,986

SOURCE : United States Department of Commerce, Office of International Trade.

TABLE 4. — IMPORTS BY LATIN-AMERICAN COUNTRIES OF EDIBLE FISHERIES PRODUCTS, PRE-WAR AND 1946-49 [1].

Country	Prewar[2]	1946	1947	1948	1949
	(.....Metric tons.....)				
Argentina	9,897	3,586	[3]...	...	...
Bolivia	650	694	700*	...	...
Brazil	19,368	10,422	15,982	...	...
Chile	392	99	66	29	...
Colombia	1,045	776	2,061	1,174	...
Costa Rica	546	263	578	485	...
Cuba	12,540	9,236	15,840	14,379	15,668
Dominican Republic	1,884	958	2,437	3,452	2,864
Ecuador	[4]431	500*	617	...	...
El Salvador	127	85	276	...	...
Guatemala	[5]275	142	378	...	...
Haiti[7]	[6]2,823	428	1,814	...	...
Honduras[8]	[9]105	66	95	...	166
Mexico	[10]1,422	1,607	1,379	...	...
Nicaragua	49	39	135	73	...
Panama	1,166	363	793	...	...
Paraguay	[11]75	[12]42	50	...	...
Peru	2,823	129	243	87	60
Uruguay	544	372	350*	...	...
Venezuela	3,077	396	1,381	...	...
Total	59,239	30,203	45,175	...	...

Symbol used : ... Not available in any of the quoted sources at FAO's disposal.

SOURCES : FAO *Yearbook of Fisheries Statistics* - 1947, and 1948-49 ; various publications, reports, surveys, communications, etc. from official departments, fisheries investigators, etc.

* FAO estimate.

1 Excluding edible oils and any edible miscellaneous aquatic products.

2 Average for 1935-39, unless otherwise indicated.

3 Apparently very little or no fisheries products have been imported into Argentina.

4 1938.

5 Average for 1935-38.

6 Average for the 5-year period 1935/36-1939/40.

7 Each year corresponding to a 12-month period, 1 October to 30 September. The year indicated is the end of each period.

8 Fiscal year, August 1 to July 31. The year indicated is the end of each fiscal year.

9 Average for the 2-year period 1935/36-1936/37.

10 Average for 1938-39.

11 Average for 1936-39.

12 1945.

vernment impose a duty on imported canned fish, with quotas in certain cases to protect the domestic industry.

On the other hand, a considerable increase in Latin-American exports of fishery products took place up to 1946. Since that year, however, exports of canned products have decreased but at the same time an increase is shown in the export of raw fish, particularly frozen, to be processed elsewhere. In 1950 U.S. imports of frozen tuna from Latin-American countries amounted to 13,500 tons (Table 3) while the imports of canned tuna and bonito for that same year (Peru being practically the only export country) totalled a little more than 4,600 tons. Many experts agree that the primary and most important objective in the development of Latin-American fisheries is to provide food for the population by utilization of cheap and more abundant fish and that the production of luxury commodities and other processed fish suitable for export is of secondary importance.

Tables 4 and 5 show Latin-American imports and exports of fish and fishery products.

TABLE 5. — EXPORTS BY LATIN-AMERICAN COUNTRIES OF EDIBLE FISHERIES PRODUCTS, PREWAR AND 1946-49[1].

Country	Prewar[2]	1946	1947	1948	1949
	(Metric tons)				
Argentina	229	408	...	...	...
Bolivia	ø	ø	...	...	...
Brazil[3]	7	1,114	11	...	...
Chile	135	1,672	1,754	892	...
Colombia	ø	1*	4	—	...
Costa Rica	1,377	1,728	3,290	2,865	...
Cuba	196	588	750	1,042	1,102
Dominican Republic	ø	ø	...	—	...
Ecuador	1	47	...	...	...
El Salvador	1	ø	1	...	...
Guatemala	ø	ø	...	...	...
Haiti[4]	1	ø	...	...	...
Honduras[5]	[6]ø	12	10	...	42
Mexico	[7]7,406	18,174	...	...	...
Nicaragua	ø	—	—	—	...
Panama	—	1	129	...	...
Paraguay	ø	ø	...	...	...
Peru	ø	9,885	5,214	5,645	8,825
Urugayu[8]	[8]18	220*	...	...	...
Venezuela	50	4,294	989	...	...
Total	9,421	38,144	...	...	...

Symbols used : — Nil, zero ; ø negligible ; ... not available in any of the quoted sources at FAO's disposal.

SOURCES : FAO, *Yearbook of Fisheries Statistics* - 1947 and 1948-49 ; various publications, reports, surveys, communications, etc., from official departments, fisheries investigators, etc.

* FAO estimate.

1 Excluding edible oils and any edible miscellaneous aquatic products...

2 Prewar : average for 1935-39, unless otherwise indicated.

3 Quantities exclude other edible aquatic animal products for which figures are not available.

4 12-month period, 1 October to 30 September. The year indicated is the end of each period.

5 Fiscal year, 1 August to 31 July. The year indicated is the end of each fiscal year.

6 Average for the two-year period 1935/36-1936/37.

7 Average for 1935-38.

8 Average for 1935-37.

Latent Possibilities

Latin America is becoming cognizant of the wealth of her coastal and inland waters. Energetic action is being taken in a few countries to utilize this natural resource to provide protein food for their people and, in certain cases, to develop national brands to place on the international market.

Existent fisheries are not equally well developed in the various Latin-American countries. For instance, inland fisheries are important only in *Brazil*, *Argentina*, and *Venezuela* on account of their extensive river network. In these countries, the fresh-water fisheries assume great importance as a major food resource for the inland people, but the river and lake fisheries are seldom industrialized in Latin America. Throughout most of the region fresh water fisheries are handled by individual fishermen who usually own no more than a small canoe and a few hooks and lines, and who rarely make their living the whole year round by fishing. In such conditions primitive fishing methods prevail and the introduction of modern equipment is prevented both by the fishermen's lack of ready money and by the limited purchasing power of his customers (Myers, 1948). The surveys made in the past years in several Latin-American countries point out that the development of inland fisheries, and the application of modern and inexpensive methods of fish farming, particularly with the most promising indigenous species, would improve the food situation in inland areas.

The waters off the desertic coast of northern *Chile* and *Peru* are among the richest in the world in anchovies and sardines, and these are available almost the entire year. It is possible to catch these species in large quantities for drying and salting; subsequent pressing of the salted dried fish into bricks is a cheap and effective method of preservation. This valuable food product could, according to authoritative sources, be available at a price well that below of fish meal. This product keeps well, is highly concentrated, and can easily be distributed, provided that outlets can be found.

Should the demand of the Latin-American domestic markets increase, or new foreign markets be opened to Latin-American fish products, it is likely that a great deal of expansion could take place in the Latin-American fisheries; not only could fresh fish production be increased but processing would also become profitable for some species.

Development Problems

There is a possibility of developing fish industries in many of the Latin-American countries since fish can be produced, in general, at a cost lower than that of meat and one within the reach of low income groups. In a few countries, however, mainly in Uruguay and Argentina which are cattle and sheep producers, fish, crustaceans and mollusks are usually more expensive than meat. The high price is a factor limiting the expansion of the fishing industry in these countries.

The commercial fisheries, as a whole, are probably among the least progressive industries in Latin America. Industries of this type, all over the world, are generally slow to improve products or to develop new techniques, to exploit untapped resources, to correct wasteful fishing methods or to utilize their total raw materials when economically possible. This backwardness is probably the consequence of the very diffused character of the fishing industry, generally comprising small individual enterprises widely scattered along extended coast lines and involving great diversity of local fisheries beset by a notoriously unstable supply.

Action taken by certain countries

Latin-American fisheries resources need to be surveyed in order to determine the possibilities for expanding the fishing industry on a sound commercial basis ; in addition, modern fishing methods to increase efficiency should be employed after a trial period has demonstrated their suitability. Already in such countries as *Mexico*, *Peru*, *Venezuela*, *Brazil*, *Argentina*, *Uruguay*, and *Chile*, modern boats and gear are now in operation, new plants are being established for canning and preserving fish products, sanitary production methods and marketing techniques are being standardized, and attempts are being made to increase fish consumption by making this low-priced protein food available to the population (Howard and Godfrey, 1951).

In the inland areas of most tropical countries, marine fish are occasionally available, but only in the form of the cheapest salted and dried product. Under these conditions, and also in view of the usual scarcity of meat in those regions, fresh water fish can be of paramount importance.

The extent to which a fishery may develop is limited. Any single fishery is conditioned by the magnitude of the fish population and by the availability of a market for the fish. In other words, we cannot have a fishery unless we have both the fish and a market for that fish. It appears that many Latin American countries not only possess enough fish to increase their respective catches but also have enough to justify fish processing ventures ; the limitations imposed by the lack of sufficient markets must, however, be considered. We might first study how certain Latin-American countries have developed their industry within the past decade. In the whole Latin-American area there are three main channels for encouraging fisheries development, namely : (1) government-sponsored or supported development ; (2) private initiative with strong governmental guidance ; (3) completely private enterprise.

(1) *Government-sponsored or supported development.* This is found in Uruguay and Colombia. In *Uruguay*, fishing is now carried out by a government agency, the Servicio Oceanográfico y ed Pesca (Oceanographic and Fishing Service) or SOYP, an agency of the Ministry of Industry and Labor. For many years the fishing industry was handled by private individuals who, using the most primitive methods, sold and distributed fresh fish to the public. In view of these con-

ditions, the SOYP was organized with the purpose of helping individual fishermen and the fishing industry but soon, however, SOYP itself entered the field and attempted to increase fish production and to make cheap fish available to the population. SOYP was founded in 1911 but assumed a prominent role only recently when the Government increased its working capital for the purpose of developing the fresh fish industry in Uruguay on a large scale. A rather ambitious development program was undertaken involving the establishment of canneries and refrigeration plants, and the acquisition of vessels, gear, transportation equipment, reduction plants and the necessary fish-handling machinery. In addition, the research program of SOYP includes both technological and biological work.

The Uruguayan fishery industry is of distinctly minor importance. Fish has been traditionally regarded as a second-rate food whereas meat is considered a daily essential. From 1938 to the present time, Uruguayans consumed about 3,700 metric tons of fresh fish a year. The amount contributed by SOYP has increased consistently since 1945 but at the same time catches by private fishermen have decreased. Both SOYP and private enterprises provide outlets for the retail fish trade which, as well as for meat and some other commodities, is subsidized by the government.

In *Colombia*, several private concerns handle the sale of fish bought from individual fishermen, operating mainly in the commercial fishing centers of Barranquilla, Cartagena and Santa Marta. The fresh fish is carried to Bogota by the Colombian Airlines over the 400-mile route to the capital city ; of considerably more importance, however, is the Industria Colombiana de Pesca Marítima S. A. (Colombian Marine Fishing Industry), or ICOPESCA as it is commonly known, which is a government-sponsored corporation engaged in the fishing and trading of fishery products. The ICOPESCA was organized by the Instituto de Fomento Industrial (Industrial Development Institute) with the participation of the Colombian Government, the National Institute of Food Supplies, and the Department of El Valle. ICOPESCA is presently engaged in an expanded program of developing Colombian fisheries along both coasts and has recently signed a contract with a Swedish concern to develop fisheries, acquire modern boats and equipment, and establish canneries on both Pacific and Caribbean coasts. This appears to mark the beginning of more important developments along lines recommended by the Currie Plan. This plan originated with a mission of the International Bank for Reconstruction and Development and is being carried out by the Colombian Government.

(2) *Government guidance and support of privately initiated fisheries.* This is the rule in *Venezuela* and *Chile*. In the former, in addition to the Servicio de Pesquerías (Fisheries Service) of the Ministry of Agriculture, several other government agencies have played important roles in developing the fishing industry. First, there is the Corporación Venezolana de Fomento (Venezuelan Development Corporation) which has made large investments in the motorization of the fishing fleet. Secondly, there is the Banco Agrícola y Pecuario

(Bank for Agriculture and Livestock) which grants small loans to individual fishermen. The Venezuelan Development Corporation is carrying out an expanded program to continue the modernization of the fishing fleet and to increase fish production and consumption. The plan for motorization of fishing vessels was initially drawn up by the Ministry of Agriculture and Animal Industry.

For many years the *Chilean* Government has attempted to develop the fisheries in the interest of the public welfare. The measures culminated in the fishery development program of the Corporación Chilena de Fomento (Chilean Development Corporation). This corporation was created in 1939 to develop the industry and to increase production. Following this policy, the corporation has invested about Ch. Pesos 100,000,000. The main achievements have been : loans to individual fishermen, to shipyards, and to operators of processing fish plants ; building of cold storage plants ; creation of the "Compañía Pesquera Arauco"; loan of additional capital to canneries, such as the "Sociedad Industrial Pesquera de Tarapaca" and "Sociedad Industrial Chilena de Pesca" ; and the financing of the survey made by the United States Fisheries Mission in Chile in 1944-45.

(3) *Private enterprise.* During the past ten years there has been spectacular development of the fisheries industries in *Mexico* and *Peru*. The fishing industry in Mexico centers principally in several ports along the Gulf of Mexico, the most important port being Veracruz, with Mexico City as the main market. Many fishing grounds off the Mexican Pacific coast were only of local importance ; the commercial catch was dried or salted for shipment to inland markets. The development of Mexican fisheries in the waters of Lower California and the Gulf of Cortes has been taking place gradually since 1940. The new industry is based principally on the fishing of shrimp, sea bass (totuava), and shark. Several new freezing plants have been constructed and a fishing fleet, which at present consists of over 450 trawlers, has been built. At the same time important facilities such as shipyards, repair shops, fuel supplies, etc. have been provided. A cannery industry for abalone, pilchard, and mackerel has developed at Ensenada, Lower California (Osorio-Tafall, 1948).

Notwithstanding the increasing Mexican catch, the domestic market is not yet highly developed and it is certain that many commercial species of fish, relatively inexpensive and available in considerable numbers in Mexican waters, are not being utilized to supply the national market in a degree comparable to their abundance. The result of this situation is that fish, which should be inexpensive, actually commands luxury prices. Tuna and shrimp, Mexico's largest fisheries, and other luxury commodities such as abalone and spiny lobster are used almost entirely for export.

United States fishing boats operate off the Mexican Pacific Coast under *Via La Pesca* permits (enroute fishing licences). Vessels of Californian registry from the ports of San Pedro and San Diego account for almost the bulk of the catch of tuna and similar species in Mexican waters. In recent years, new fishing grounds for shrimps and other species were developed in the waters of Campeche and in

the Gulf of Tehuantepec. Some Mexican vessels with quick freezing equipment, some with refrigeration, and others with ice, were put into operation, as well as quick freezing plants and other facilities on land.

The *Peruvian* fisheries production has increased nearly ten times during the 11-year period 1939-1949. The principal commercial species are bonito, mackerel, drum, seabass, tuna and swordfish. The expansion of the Peruvian fishing industry is due to the development of the fish canning industry, the first canneries having been established in 1939. Today there are 25 plants in Peru actively engaged in canning bonito and tuna ; of this total, 7 plants are reported capable of producing 1,000 or more cases (48 cans of 8 oz., 227 g.) in 8 hours. After 1945 another 19 plants were installed and started operation. Recently, a fisheries technology laboratory was established by the Peruvian Ministry of Agriculture in Callao for the purpose of developing and testing methods of processing and preserving fish. Another recent step was the approval given by the Peruvian Government to a program for developing the resources of inland waters. For this purpose a fish culture station was established at Santa Eulalia.

At present the *Brazilian* catch is the largest of any Latin-American country. The production of sea and fresh-water fish in 1949 was about 152,606 metric tons. While the fishing industry is entirely a private one and exclusively for local consumption, the Government assists it as well as the related industries through the Division of Hunting and Fishing. The Division gives attention to the health of fishermen, provides primary education for them and their children, and regulates the administration of the fish markets in Rio de Janeiro and other states (Joint Brazil-United States Technical Commission, 1949).

In *Argentina* the situation of the fishing industry is different. Private enterprise works side by side with the government-sponsored *Flota Mercante del Estado* (State Merchant Fleet) which, among other activities, has a fisheries section and several trawlers operating on the Argentinian shelf. The catch is brought to refrigerated store houses in Buenos Aires and distributed to the many fish markets of the city.

Fishermen

The total number of fishermen in Latin America is estimated at 150,000*. Their income in most of the Latin-American countries, as often elsewhere in the world, is generally very low, and consequently their standard of living is very poor. A very large number of small boats, mostly not powered, are in use. The lack of mechanization and consequent lack of efficient mass production methods account for the very low output per fisherman (Table 2). With modern craft and equipment at their disposal these fishermen would, without any difficulty, master the most modern fishing methods suitable to their environment and working conditions. But unfortunately fishermen in most Latin-American countries find it impossible to obtain credits or loans. Fisheries activities are handicapped by lack of extension

* FAO estimate.

work amongst the fishermen and sometimes by their poor conditions and social organization. Where fishermen are organized in co-operatives (e. g. in Mexico) or where they are helped by government development corporations (e.g. in Venezuela) mechanization of fisheries has been progressing and the social and economic conditions of fishermen have greatly improved.

Fish Consumption

Latin-American countries have a surprisingly low per caput consumption of fish and fishery products ; in some places consumption is almost negligible. This is due mainly to the fact that prospective consumers are neither accustomed to the preparation and eating of fish, nor aware of its nutritive value. Some species are highly esteemed while others, equally nourishing and palatable, cannot be sold. In nearby countries, the same commercial species are accepted in varying degrees.

Table 6 shows the low fish consumption in most countries of Latin America except Venezuela (16.6 kg. per caput) and Chile (10.5 kg. per caput). Eight countries have a consumption of less than 1 kg. per caput. The remainder consume between 1 and 4 kg. with the excep-

TABLE 6. — ESTIMATED ANNUAL PER CAPUT RETENTION OF FISH AND FISHERY PRODUCTS IN LATIN AMERICA [1].

Country	Prewar[2]	1947[3]
	(.....Kilograms[4].....)	
Latin America (average)	2.0	3.1
Argentina	4.5	3.79
Bolivia	0.4	0.38
Brazil	3.0	3.25
Chile	7.2	10.41
Colombia	0.3	0.62
Costa Rica	1.4	1.44
Cuba	5.2	4.25
Dominican Republic	1.4	1.37
Ecuador	0.8	0.47
El Salvador	0.1	0.24
Guatemala	0.1	0.16
Haiti	1.6	1.22
Honduras	0.2	0.11
Mexico	0.4	1.64
Nicaragua	0.2	0.14
Panama	3.2	2.25
Paraguay	0.3	0.33
Peru	0.9	2.82
Uruguay	1.9	1.56
Venezuela	5.9	16.58

[1] Retention : total catch plus import minus exports ; could be used tentatively as an index of consumption.

[2] SOURCE : *Agriculture Requisites in Latin America.* Joint ECLA/FAO Working Party Report. United Nations, 1950.

[3] Total retention divided by number of inhabitants.

[4] Per year per person.

tion of Cuba with a consumption of 4.25 kg. per caput. The average for all Latin America is 3.1 kg.

In Latin America, many attempts to increase the domestic consumption of fish and fish products have failed. A type of fishing enterprise which is successful elsewhere is not necessarily as effective when transplanted to a Latin American country. Latin America presents another environment, offers different social, economic, and political conditions which must be taken into consideration before a development plan can be carried out. For any immediate increase in fish supplies it would, perhaps, be advisable to carry out a number of small, less ambitious but economically sound projects which, in the aggregate, would considerably increase production. For each Latin-American country, the nationwide development of fisheries must be a slow and gradual process, of the evolutionary type, because any hurried spectacular measures are bound to fail. The pace of development will largely depend on the training and experience of the personnel engaged in the fishing industry.

Fishermen's Associations

One of the most important factors influencing the success of fishing enterprises is the social organization of fishermen. In the majority of Latin American countries, fishing activities are carried on by independent fishermen, many of whom operate with primitive equipment, their activity restricted almost entirely to coastal waters, estuaries and lagoons. In Mexico and Brazil, fishing laws and regulations encourage the fisherman to form association, termed *Cooperativas* and *Colonias*, respectively.

Mexican *Cooperativas* form the largest group of fishermen, and account for the greater part of Mexican landings. Cooperative fishermen work on a share basis ; the *Cooperativa* handles the sale and distribution of the revenue among members, according to the value delivered and the relative ownership of boats and gear. In 1947 there were 7,639 Mexican fishermen listed as members of these *Cooperativas*; in addition, it was estimated that there were also 4,000 fully independent fishermen working commercially, not members of any of the legally-organized *Cooperativas*. Mexican laws grant the *Cooperativas* certain tax exemptions and other privileges, such as the exclusive right of fishing certain important commercial species such as shrimp.

Brazilian law requires fishermen to be members of a *Colonias* in that zone where they live or dock their boats. *Colonias* are groups of more than 150 professional fishermen organized for social, educational and economic purposes, and their zones are established by competent authorities. In each state there is a federation to which the local *Colonias* are subordinated. These federations, in turn, are subordinated to the General Confederazion of Brazilian Fishermen (Confederaçã Geral dos Pescadores do Brasil), the central organization, which has its main office in Rio de Janeiro.

Education

The majority of Latin American fishermen are hard working enterprising and intelligent. Because of these qualities they are capable of mastering new techniques and, given expert instruction, could be relied upon to increase production.

The training of fishing boat masters, engineers and fishermen in the modern art of fishing is a real necessity in the development of Latin American fishing industries. There are fishing schools in several countries, in Brazil, Chile, and Mexico, for instance which appear to be doing a good job. They need however, a great deal of assistance and support. These schools must be better organized and equipped to enable them to provide their students with practical courses; they should be equipped, accordingly, with boats and modern fishing equipment, and they must plan a more efficient teaching program.

In several countries, such as Mexico, where fishing laws permit foreign fishing activities in their waters, national law requires the inclusion in the crew of a certain percentage of native fishermen who in this way are able to obtain excellent training in the field.

Special Problems in Financing Fisheries Enterprises

Many Latin American Financial institutions grant credits to fisheries industries, but mostly for industrial purposes. It is felt that an extension of this credit program, to include individual fishermen and fishermen's organizations, and to increase the funds available for that purpose, would be of great help in the development of fisheries. Indeed, few of the Latin American countries are extending credits to individual fishermen for the acquisition of boats, motors, or gear. Exceptions include the Venezuelan Development Corporation and the Chilean Development Corporation.

Brazil's Caixa de Crédito da Pesca (Credit Bank of the Fishing Industry) located in Rio de Janeiro provides financial assistance to fishermen, shipowners and canners and aims at fostering their ultimate independence. The Caixa de Crédito da Pesca is a public organization under the Ministry of Agriculture, but, unfortunately, does not have at its disposal sufficient resources to handle the responsibility of the economic development of the fishing industry and its related activities. The bank's capital is mainly derived from the 3 percent tax collected on fish at receiving stations and markets.

The *Argentinian* Banco de Crédito Industrial (Bank of Industrial Credit), the *Mexican* Nacional Financiera and the above-mentioned *Venezuelan* and *Chilean* Development Corporations, may grant credit up to a maximum of 80 percent to projects considered both sound and in the national interest. Loans, however, show preference for larger industries rather than fishery projects.

Credit problems

The problem of credits is of paramount importance in the development of fisheries. In addition, present Latin American foreign exchange difficulties greatly hinder improving or re-establishing fishing facilities, and the best maintenance of the fishing fleet. Anything that could be done to alleviate this situation would greatly assist the fishing industry, particularly with regard to the import of boats, engines, gear, refrigeration and processing equipment.

It appears that three main types of credit are needed (Jul, 1950) (1) To assist the financing of major fishing operations or fisheries industries ; (2) To assist the individual fishermen, co-operatives, distributors or retailers, to obtain engines, boats, insulated trucks and refrigeration equipment ; (3) To make available small short-term loans, on short notice ; to finance local activities or fishing trips.

It is unfortunate that Latin-American private capital, following traditional caution towards new enterprises, does not invest enough risk capital in the fishing industry which is necessary to permit its expansion on a sound commercial basis. Foreign capital is rarely available for such enterprises, because it is reluctant to invest in an industry dependent upon such variable factors, some of which are most difficult to foresee. Yet, it is in Latin America itself that this additional animal protein in the form of fish is badly needed ; it is to be hoped that the governments concerned, by guiding and assisting the industry, may succeed in translating this need into effective demand. If so, increased production would not mean increased competition on the world market.

Markets

Domestic Markets. It seems beyond doubt that Latin American inland and marine waters could produce much more fish. In several countries this could be accomplished with present equipment. In some localities, catches are often maintained at a low level to prevent flooding of the market. Among other difficulties encountered in developing the domestic markets is that of providing wide distribution of fresh fish. For instance, in tropical countries the marine fishery supplies the coastal communities, but there is comparatively little fresh or canned sea fish shipped inland. Refrigerated transport is often inadequate or missing entirely, due to its high expense. This explains why sea fish reach interior populations only occasionally and in the form of the cheapest salted and dried products. Moreover, the general economic level of the Latin American inland population is usually so low that refrigeration or canning adds enough to the cost to put the product beyond the means of all except wealthy people. These interior areas, therefore, should be studied as possible future markets for fish products.

The fresh fish trade in Latin America, even in the most progressive communities, often leaves much to be desired particularly as to the hygienic conditions under which it is carried out. Measures to improve these conditions demand high priority.

The problem of increasing fish consumption and developing a domestic market will not be solved easily in Latin America. Fishing industries there have rarely taken active steps to educate the public; fresh fish is not advertised at all and very seldom does an informative article on the nutritional value of fish appear in print. Moreo er, in many Latin American towns prices, even for fresh fish, are considerably higher than for meat, and often not within the reach of the lowest income group.

Considering the relatively low per capita consumption of fish and fish products in Latin America it is believed that the domestic market could be greatly expanded, provided that good quality fish are available, if an intensive educational campaign could be directed to consumers. An effective means of government assistance could be the provision of travelling dietitians and fish cookery experts who could give demonstrations, prepare fish dishes, talk to housewives, educate hotel and restaurant chefs in the handling and cooking of fish, and also distribute pamphlets, organize school educational programs, prepare articles in newspapers and magazines, etc.

The prices of fish commodities are rigidly controlled in several Latin American countries, for example in *Peru* where the government policy includes regulation of prices at the consumer level. Fish terminals or *entrepostos* were instituted in *Brazil* in 1934 in order to collect fish from the production and consumer centers of the country for its inspection and refrigeration, or sale at auction or retail; such central markets also furnish ice and fuel to fishermen, and permit the better collection of statistical data.

Other Markets within the Region. The majority of Latin-American countries producing fish for export are interested only in foreign markets which pay in hard currency. It is believed that a study of the economic conditions of Latin American markets could reveal new outlets for fish production in several of the most favored countries. For instance, *Chile* could considerably increase its fresh fish and shellfish catch to supply the demand for these products in Argentinian and Uruguayan markets where such commodities, particularly the luxury ones, bring high prices. It is felt that the fish canneries already established in Latin America could greatly assist in supplying neighboring countries with much needed inexpensive protein foods. Canned fishery products have always been popular in that area, but consumption has been decreasing because of economic reasons. A greater use of canned fish within the country of origin, or in neighboring countries, will do much to stimulate the production of this popular food. In this way a solution could be found for the difficulties now confronting the Venezuelan sardine-packing industry.

Markets in other Regions. Mexico is the largest exporter of fish of the Latin-American countries. Mexican exports of fish products to the United States totaled 20,806 tons in 1949,[1] making it the second largest exporter of fish to the United States, second only to Ca-

[1] United States Department of Commerce, Office of International Trade.

nada which in the same year exported 211,715 tons of fish products to the United States. Mexico's main export item is shrimp, which is shipped headless and frozen in 5 lb. blocks, or packed in boxes with ice. During 1950 this export amounted to 17,986 metric tons.

Costa Rica, *Peru*, *Mexico*, *Ecuador*, and the *Panama Canal Zone* exported about 13,519 tons of frozen tuna to the United States in 1950. This was processed by tuna canneries in California. Practically, the only Latin American countries exporting canned fish are *Peru* and, to a lesser extent, *Chile*. The United States is the most important market. During 1950, United States imports of canned tuna and bonito from *Peru* totaled nearly 5,000 tons, and imports from *Chile* about 75 tons. The extent to which these countries can keep the present foreign markets and develop new ones remains to be seen.

The Future of Latin-American Fisheries

The known fishing grounds of Latin America appear to permit a yield many times greater than the present yield and the catch could be increased immediately if modern methods and equipment were used. This view was confirmed by surveys conducted in several countries of the region by United States Fish and Wildlife officers and by specialists of the former Anglo-American Caribbean Commission.

The factors hindering fisheries development in Latin America are many. There is a general shortage of all types of gear ; the number of boats is inadequate ; existing fishing fleets are in need of repairs ; operations are curtailed by the difficulty or even impossibility of obtaining loans and credits, and also by the scarcity of gasoline and fuel oil ; refrigeration and storage facilities are very limited ; transportation facilities to inland areas are poor or non-existent ; some fishermen wishing to better their income look for more remunerative occupations, with a resulting decline in their number ; fishing operations are generally conducted on a small scale and there are not enough large-scale units.

As we have stated before, the main difficulty is a lack of sufficient markets, and there are a few instances where fishing grounds are not sufficiently productive. The shortage of equipment is a limiting factor mainly in countries having foreign exchange difficulties.

The elements essential to a program designed to develop Latin-American aquatic resources as an important source of food would include biological investigations to determine the causes of fluctuations in abundance and depletion of important species ; technological studies to improve processing, handling and distribution of fishery products and by-products ; exploratory fishing to appraise the potentiality of the fishing grounds already known, and to discover new productive areas ; economic and statistical studies on production, marketing, prices, investments, labor and costs ; development of inspection, standards and grades of quality for the processed products ; a realistic and adequate credit system ; consumer education ; improvement of fish culture and fishery management and research ;

and adequate enforcement of the effective laws and regulations, as well as conservation measures. The development of the fisheries should be carried out by giving proper attention to the development of methods of distribution, handling and processing of the most valued commercial species and their by-products.

The greatest part of this program can and should be carried out by national governments ; yet a part of this program could be handled through international cooperation. It is in this field that the Fisheries Division of FAO could be of assistance to the whole Latin-American region in general, and to each country in particular.

Development and conservation of fisheries resources in Latin America will require national legislation based on scientific knowledge to enforce such measures as would promote the highest sustained production at the lowest cost without in any way endangering future productivity. The keystone to conservation in Latin America, as elsewhere, must be adequate research. The greatest handicap now is lack of knowledge of the location, life cycles and potentiality of these resources. Yields of several well-known species of fish and shellfish could be substantially increased through a more intensive fishery. Production of other species, mainly those of local importance, could also be enlarged. The application of farming methods for fish pond culture could produce an extra supply of protein food in inland waters.

Marine fishery resources differ from fresh water ones in that they are quite often international in character. Marine fishes do not respect international boundaries or the jurisdiction of nations over claimed territorial waters. Wise use of such resources is, therefore, an international problem. *Ecuador*, *Peru* and *Chile*, for instance, which are interested in tuna and similar species caught in the coastal waters and in the high seas off the west coast of South American, must confront and solve these problems, which are the same or very similar for each of these countries. Fishing on the high seas is also of interest to the United States. Latin-American countries should develop their fishing industries along common lines, using similar equipment and methods. The first way in which they could help one another would be to exchange views and information on the best manner to solve common problems and how to evolve similar ways of approaching them. Fishery research must be undertaken through joint biological investigations, experimental fishing, co-ordinated collection of statistics and so on. Such problems are international in scope and their solution must be sought through the co-ordinated efforts of the various countries concerned. Technological research should study those fishing and processing methods adapted to the particular consumption habits of the several countries. Here again there should be co-ordination between nations. Since fishing laws sometimes hamper the activities of nationals from other countries, it would be advisable to reach international agreements providing solutions to some of these problems. Education of fishermen must be expanded through special schools and extension programs ; such work, carried out nationally but following international standards, could be greatly expanded by the use of accepted textbooks, visual aids, etc. Education of scientists, technicians and managerial per-

sonnel is needed, but this would seem possible only through co-operation among the nations concerned.

The functions and responsibilities of the FAO Fisheries Division include recommending the wise development and utilization of aquatic resources, encouraging the development of comprehensive national and regional policies, assisting member governments in the solution of technical problems of fishing, handling and distribution of fisheries products; and the making available to them of information to assist them in improving production, consumption and trade of fisheries products.

Complying with the resolution passed by the 1947 session of the FAO Conference, the Organization took action to initiate the formation of regional councils for the scientific exploration of the sea. An agreement for the establishment of an Indo-Pacific Fisheries Council was accepted by the governments concerned, and the Indo-Pacific Fisheries Council was established, its first meeting having been held in Singapore from 24-31 March 1949. A similar Council has been approved for the Mediterranean area.

The delegates from Latin American governments to various FAO Conferences have also expressed the consciousness of their mutual interest in the development and proper utilization of the living aquatic resources of Latin America. They have realized that many of the problems which countries will face in this greater development will depend for their solution upon the sharing of knowledge, the exchange of information and the comparison of experience between countries.

They therefore have urged that steps be taken by FAO to explore the possibility of bringing the interested countries together so that they may form a Latin-American Fisheries Council under FAO auspices. Such councils are consultative bodies in control of their own programs, each sovereign government determining its own activities towards the solution of the problems that are common to them all. The councils are, however, linked to FAO which supplies the secretariat, and thus the regional council is in charge of its own affairs federated to other such regional councils through the international organization of FAO.

During 1950 certain preparatory work was done in Latin America and a preparatory meeting of interested nations has been convened for September 1951 in Lima, Peru. At this meeting the delegates will consider the function, scope and organization of their Latin-American Fisheries Council. These considerations are to be embodied in a draft agreement to be unanimously recommended to their governments for acceptance. Following this acceptance an inaugural meeting of the council, or councils, if there are to be more than one, will be called.

Such bodies would in no sense duplicate the work which is undertaken by certain fisheries agreements or treaties between Latin-American countries and the United States of America, such as the Mexico-U.S.A. International Convention for the Scientific Investigation of Tuna, and the Inter-American Tropical Tuna Commission constituted by representatives of Costa Rica and the United States. These

bodies are in charge of making investigations and recommendations for the more efficient regulation of these fisheries. They differ from the proposed Regional Council, in that commonly they are bilateral and will maintain staffs of scientists to investigate specific problems defined by treaty or convention ; their actual task is to formulate recommendations governing fishing. The Latin American Fisheries Council, which is to be much more general in its scope, could co-exist with such bodies and would be complementary to them. It is FAO policy to maintain close cooperation with them and any other bodies that have as their aim the betterment of fisheries.

FAO will extend all possible aid to the council and hopes that, once the Latin American Fisheries Council is established, it may be instrumental in the development and better utilization of the fisheries resources of the region.

B. F. Osorio-Tafall

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FISHING CRAFT AND GEAR

A Summary of Information from Various Member Governments Reported to FAO in 1950

The Annual Reports to FAO from member governments are an indication of the efforts made around the world to improve fishing methods in order to increase the yield of fish from their waters. The reports are not written in a uniform style ; some governments cover developments more or less extensively than others. The following extracts are a mirror of these reports rather than a true picture of world-wide developments, but in any case they are a proof that something is going on and a promise for the future.

Africa

British East and Central Africa. Native and European fishing methods were being studied on Lake Nyasa. In Zanzibar a European type motor fishing craft was being built locally, and a local dhow was being motorized, in both cases to test the commercial possibilities of powered fishing craft. The fisheries of Lakes Rukwa and Tanganyika were being developed. An experimental motor fishing craft was at work on the coast of Kenya. The Lake Victoria Fisheries Board, an interterritorial body which administers the fisheries of the Lake, was studying the catches of different types of native nets.

British West Africa. A fishing boat with a British skipper began experimental and demonstration fishing in Gambia. Two demonstration trawlers were working on a commercial scale in Sierra Leone, but engine trouble handicapped the work. They have shown, however, an interesting rate of catch per unit of fishing time. Two motor fishing craft continued demonstration fishing under British skippers in the Gold Coast. A small inshore general-purpose fishing craft began trawling in Nigeria where existing native fishing methods were being improved.

Egypt. The Fisheries Department encouraged the substitution of up-to-date techniques for the primitive methods which were commonly used. At the end of the period covered by the report, there were more than 300 motor vessels of various sizes ranging from 45 to 75 ft. (13,7 to 22,9 m.) and, accordingly, of various powers, from 50 h.p. to 200 h. p., distributed among the ports on the Mediterranean and the Red Sea. Principal fishing methods include trawling, seining and line-fishing ; the last is specially encouraged in the Red Sea for fishing on the coral reefs and in the wide areas where trawling is impractical. The number of fishing boats was expected to increase.

Mauritius, Seychelles. The two year survey of the Mauritius-Seychelles fishing beds was successfully completed in December 1949.

Union of South Africa. Fishing methods have not changed during 1950, but larger trawlers have been placed in commission. In the inshore fishing industry, new purse-seine boats were added to the fleet for catching pilchards and horse mackerel (maas-bankers) for canning, and for oil and meal production.

The new fisheries research vessel *Africana* II, delivered in February 1950 and commissioned in April 1950, together with the two smaller-sized survey craft of the Fisheries Division of the Department of Commerce and Industries and most of the scientific staff started operations on a long-term program of investigation of the pilchard fishery.

America

British West Indies. An experimental fishing craft started work in Barbados.

United States of America. A promising shrimp fishery was discovered off Key West, Florida, and was prosecuted vigorously during the spring of 1950 by a large portion of the Gulf of Mexico and South Atlantic shrimping fleets. In New England, large catches of *trash* fish, mostly cheap or unmarketable species, provided raw material for local fish meal and fish oil plants.

Interest in improved production practices continued. A large New England trawler went to sea in July 1950 equipped to fillet, package and freeze its catch at sea. Loran was being used effectively by New England trawlers to pinpoint good fishing grounds. Helicopters as well as conventional planes were becoming standard ac-

cessories of California tuna clippers for locating bait and tuna. Atlantic menhaden fleets were also utilizing planes as fish spotters. Both Gulf and Atlantic menhaden vessels, in an effort to cut costs, were testing Pacific Coast purse seining methods of setting the seine directly from the vessel rather than from auxiliary boats. Steel halibut lines are used in the Pacific Coast fishery, and nylon nets have been widely introduced for both fresh water and marine use. Pumps were being adapted to unload the catch from the nets as well as from vessels holds.

The three Fish and Wildlife Service research vessels based at Honolulu, Hawaii, and the new laboratory in the same place, were in full operation on exploratory fishing. Two Fish and Wildlife Service research vessels were provided for Gulf of Mexico studies; the fisheries exploratory vessel was already at work while the biological and oceanographical vessel was expected to be in operation in the latter part of 1950.

Venezuela. Since its beginning in May 1947, the Fisheries Development Corporation has dealt with acquisition of motors for fishing vessels in accordance with the Ministry of Afgriculture's program. Simultaneously with the purchase of marine engines, selected by various technical commissions, investigations on different aspects of the fishing industry were carried out. These included study trips to the most developed fishing areas in the country, and, as a result of these trips, the program of the Corporation for the second year was expanded. During 1948, it was possible to increase the staff and the service of an expert in credits, a naval architect, and an assistant were obtained.

The motorization program is considered a complete success; in 1941 less than 100 of the 4,260 fishing vessels were motorized but by the beginning of 1948 this number had increased to about 800.

The influence of motorization can be appreciated by looking at the progressive increase of the national fish production, as follows:

	1945	1946	1947	1948
Total production (metric tons)	28,442	36,509	40,856	52,822

Although these increases were not due solely to the greater number of motorized fishing vessels, the partial influence of this factor cannot be denied. A new lot of more powerful motors was being purchased.

ASIA

Aden. A motor fishing craft with a British skipper continued experimental power-fishing methods off the coast of Arabia.

British Colonial Territories in the Far East. The long established Fisheries Department for Malaya and Singapore continued its work on the improvement of sea fisheries. In Sarawak, a power-driven demonstration fishing craft successfully introduced a new type of fish trap adapted to power handling; seven other craft were using this method, with the result of a greatly increased catch of prime fish. Work continued on the improvement of other fishing methods. In North Borneo the rehabilitation of the fishing industry was completed, and the introduction of power-fishing methods was planned. Plans

were being drawn up by the local fishing interests, in consultation with naval architects, for the building of motorized fishing craft in Hong-Kong. A successful type, suited to local conditions, would gradually replace the present sailing fleet.

The line of development consistently pursued in the Colonial territories has been to work from the bottom upwards. That is, instead of an effort to impose large scale commercial fishing upon a primitive fishing community, Colonial policy aims at a gradual upgrading of the local fishing communities by the introduction of cheap and simple power plants and methods. Once these become established, further expansion will be automatic in future years.

Ceylon. A program for the introduction of more modern craft and fishing techniques received active consideration. During the year new items of equipment were introduced into the fiisheries stores. Of these, nylon captured the interest of the fishermen who began to use it in increasing quantities in place of cotton lines. The specialized requirements for certain sizes and shapes of fish hooks were investigated, and samples of hooks were despatched to well known manufacturers in order to obtain supplies of the exact requirements of the fishermen. Samples of fishing nets were obtained from Japan for testing.

Assistance was rendered in the removal of obstructions to navigation both by the blasting of rocks and reefs, and by desilting of channels ; beacons were erected as aids to navigation. The construction of two fishery harbors was completed.

Mechanized fishing operations were continued with the trawler *Raglan Castle* and the seiner *Halpha*. The trawler continued to show that definitely good prospects existed for the operation of a trawler fishing industry ; the seiner proved that Danish seining in Ceylon waters would not be a profitable undertaking. The seiner was also used for various other experimental mechanized fishing operations such as drift netting, long lining, and towing of canoes, thus providing a valuable fund of information on these activities. Three life boats, together with a British motor fishing vessel, were engaged in towing operations with native fishing craft on the mother ship principle. A new trawler was purchased in the United Kingdom to increase trawling operations.

China. Careful planning and promotion by the Provincial Government of Taiwan resulted in an upward trend in both the number of fishing vessels and the number of fishing crews.

India. The efforts for increasing fish production continued. The introduction of fishing with mechanized vessels proved to be a slow process, and the bulk of the fishing fleet continued to consist of craft of various types capable only of fishing a few miles off shore. Four Danish cutters of an over-all length of 85 ft. (25.9 m.) and two reekie boats of 50 ft. (15.2 m.) each, acquired during the year, worked in Bombay waters in connection with the Central Government's pilot Deep Sea Fishing Scheme. In addition to landing some quantities of fish, these vessels were used for charting the fishing grounds and other ex-

ploratory work. The West Coast Fisheries Ltd., Travancore, in addition to their trawlers, had their vessels take out to the fishing grounds a number of indigenous craft for fishing mostly with hand lines. A similar type of dory fishing was also carried out on a small scale in Madras. Two trawlers with the necessary complement of crew were being obtained from Japan by a private fishing company established in Calcutta for fishing in the Bay of Bengal.

Indonesia. The fishing industry has been stimulated as much as possible by the provision of fishing boats, boat building materials, nets, fishhooks and salt to replace equipment and material lost during the Japanese occupation. This resulted in a production increase in East Indonesia and Borneo to above the pre-World War II level. Notwithstanding this improvement, fish deliveries for the other parts of the country were still less than half the prewar level. The fleet of fishing proas numbered only 2,000, or half its prewar number. A plan existed for the allocation of suitable timber on credit to local fishermen, so as to encourage the reconstruction and renewal of the fishing fleet.

The fishing areas at Pulu Laut, South East Borneo, and in South Sumatra could be rendered much more productive if transport facilities were improved. There was a plan for providing both areas with fish-carriers. The carrier assigned to the first area would convey salted fish to Bandjermasin from which trans-shipment by regular shipping line is possible ; the other one would bring fresh fish on ice to Tandjong Priok.

Japan. New catch methods, including the use of American style purse seines in bonito and tuna fishing and lights inside the fence of fixed nets in mackerel and mackerel pike fishing, were adopted. Echo sounders were used by about 300 boats with good results in sardine fishing in the East China Sea and in bonito fishing off the Pacific Coast. With the use of light, a method of capture developed after the war, and the use of larger boats in the skipper fishery, production reached such a peak in 1949 that it was necessary to reduce the number of these boats in the 1950-51 fishing season. The United States type tuna purse seine was operated on a trial basis in 1949. Although only 750 tons were caught by this method, its wide use in the near future was anticipated. About 20 purse seiners were planned for operation in 1951 to increase the production of skipjacks and mackerels. Mother ship type tuna fishing was permitted to operate as far south as the Equator on 11 May 1950. Two fleets consisting of two mother ships and 38 fishing boats began operations in that area.

Since the fishing areas were extended and marine products have become one of the most important export items, installation of refrigerating equipment and insulation in fishing boats was contemplated in order to assure best possible transportation of the fish.

Philippines. There was an increase in the number of commercial fishing craft. Fishing methods of primary importance were those employed by off-shore fishing boats of over 3 tons gross. Of the

fishing gears, such as the basnig (bag net), utase (beam trawl), and sapiao (round haul seine), 80% are classified as antiquated ; the rest were modern type, mainly the otter trawl and purse seine. The former, because of its efficiency and ease of operations, gained popularity among the fishermen through the efforts of the fisheries trainees returned from the United States. It was felt that if the trend towards adoption of modern fishing methods and mechanical labor-saving devices continues, the labor problem in the fisheries might be solved in the near future.

Turkey. Some cold storage equipment and fishing vessels were ordered with Marshall Aid Funds but the number was far from being sufficient. With the use of this equipment, production was expected to increase fivefold. A hydrographic and three other vessels for water studying purposes were ordered with Marshall Plan Aid.

EUROPE

Austria. Subsidies were granted by the provincial governments for the purchase of electro-catching gear. A fisheries exhibition was organized for the first time at the international Vienna Autumn Fair 1950, to be circulated thereafter in all Austrian provinces.

Denmark. About 40 new cutters, from 25 to 60 tons, were launched in the course of 1949, mainly to replace old or lost vessels. Only three big vessels were in operation — one, 266 tons gross, fishing chiefly off Greenland ; the other two, 171 and 383 tons gross respectively, built as trading vessels, were engaged part of the year as depot ships in herring fishing off Northern Iceland. Part of the cutter fleet trawled herring during the summer season, as in the two preceding years, at Fladen Ground ; other vessels, also during the summer months, carried on line fishing for porbeagle (small shark), but taken as a whole the Danish seine is still the most important fishing gear. About 10 cutters tried fishing in the Barents Sea in the spring and autumn with so much success that a large number of cutters was employed in 1950 in plaice fishing in these northern territories.

The floating or midwater trawl was used for the first time for herring fishing on a large scale in the Skagerak in 1948. The trawl is dragged between two vessels and can be adjusted for fishing at the depth in which the echo sounder registers the herring shoals. The new invention quickly became a success and was partly responsible for the favorable results of the herring fishing in the Skagerak in the autumn and winter of 1949-50. About 60 of the biggest boats were fitted with echo sounders and about 160 floating trawls were in use at the end of the year. This gear is excellent for herring and sprat fishing. It was tested at Fladen Ground in the course of the summer at herring fishing, but it proved difficult to use in the open sea when the herring were scattered, as was the case that year. It seemed possible that the use of the floating trawl might increase the catch of herring.

Finland. In 1949 the fisheries industry became steadily more stabilized. Fishing tackle became easier to obtain when new machin-

ery was installed at the net producing factories. Fishing yarn was still scarce because the demand and consumption increased considerably after it was freed from regulations. The completion of the network of light-houses increased the safety of the fishermen.

France. The program of reconstruction of the steel fishing fleet was practically completed. Thirty-one units, four of which were deep-sea trawlers, were put into service.

Experiments were made on tuna fishing with live bait on the Basque coast. Experiments were also made on drift nets, seines, and floating trawls. The use of bait tanks was very popular. As a result, the amount of tuna landed increased by nearly 85% over 1948.

Ireland. The basic objective of the sea fisheries policy was to to increase the catching capacity of the inshore fishermen by providing them with larger and more modern boats through the Irish Sea Fisheries Associations Ltd., an officially sponsored cooperative Society of fishermen. The conditions arising from the war made the acquisition of new boats impossible and it was not until 1948 that engines and boatbuilding materials, which must be imported, again became available in regular supply. Steps were then taken to modernize the inshore fleets as quickly as possible. The Sea-Fisheries Association established an up-to-date boatbuilding yard to supplement the output of the commercial yards in the country. Orders for fishing boats were also placed outside the country. During 1940-50 the Association started the construction of two additional boatyards, and these were ready to commence operations. In addition to the construction of new boats, during 1949-50, the boatbuilding yards in the country repaired old boats to keep them in commission until they could be replaced by new craft.

Netherlands. Only a small number of new units was added to the fleet. It appeared that extension was less urgent than replacement of old material. No appreciable changes occurred in the fishing technique, although the use of the echo sounder was gradually increasing, owing to better information about its possibilities.

Norway. There was a strong trend towards the use of larger seagoing vessels with modern equipment, such as echo sounding, radio telephone, etc. The fishing fleet was in good condition. A large addition of new vessels was, however, required to make up for losses and withdrawals. Loans for fishing vessels through the State Fishery Bank (Statens Fiskatbank) have increased considerably in 1949.

The new ocean research vessel *G. O. Sars* was completed in 1949 and was put into service for research work early in 1950.

Sweden. Floating trawls, which came into use a few years ago, especially for herring fishing, gained increasing popularity during 1949. A large part of the West Coast fishing fleet is now furnished with such equipment.

OCEANIA

Australia. Two ships, operating from Albany, Western Australia, were added to the steam traveling fleet. Considerable quantities of tuna were obtained with improvised gear and without any preliminary preparation by the fishermen. Following the success of this fishery, it was expected that many more boats would operate during the next season.

Research was carried out by three vessels operating full time on exploratory, oceanographical and biological work. Scientific work in connection with the New Guinea fisheries survey was done by fisheries research officers using the *M. V. Fairwind.*

New Zealand. The fishing fleet has been modernized and enlarged since the end of the war.

Territory of Papua and New Guinea. Assistance was being given to fishermen in regard to the purchase of nets and similar tackle for the improvement of production techniques.

J. O. T.

SEMINAR ON BRACKISH-WATER FISH CULTURE

Under the aegis of the Indo-Pacific Fisheries Council which is sponsored by FAO, and for which FAO acts as secretariat, the Indonesian Government organized at Djakarta, during April-May 1951, a seminar on brackish-water fish culture. The purpose of the seminar was to offer fisheries workers an opportunity of becoming acquainted with the scientific and practical problems connected with the culture of fish in salt and brackish water ponds, and to prepare the participants for extension and advisory work in their own countries. Instruction was given by means of lectures, practical demonstrations, and laboratory and field work. There was extensive discussion of the scientific aspects of the work and of the organization and the methods of extension services. The program included work in Djakarta and its environs and then extended travel through Java to Bogor, Semarang, Soerabaja and other places in the course of which the participants had the opportunity of seeing all phases of cultural practices, from fry collection to the harvesting of the fish. Workers from Malaya, Pakistan, Thailand and Indonesia attended.

G. L. K.

THE NORWEGIAN FISHERIES CENSUS OF 1 OCTOBER 1948

Fishermen

According to progress reports[1] on the Norwegian Fisheries Census, unique of its kind, Norway had 85,518 professional fishermen as of 1 October 1948; their dependents totalled 146,494. More than

[1] Given in Statistiske Meldinger, No. 12, 1950, and No. 4, 1951, Statistisk Sentralbyraa, Oslo, Norway.

half of the total number of fishermen, or 43,145, owned a home of their own. Of these, 17,329, 41 percent of all who answered, had electric light in their homes; 15,545, 37 percent of all who answered this question, had water piped into the house.

Many fishermen also farm. In 1948 as many as 35,567 farms or small holdings were owned or managed by fishermen. The amount of time spent in fishing by the total number of fishermen can be broken down as follows:

	Number of fishermen	Average number of weeks fishing per annum
Sole occupation	16,737	31.2
Main occupation	51,705	20.4
Occasional occupation	17,076	11.4
Total	85,518	21
Fishermen also engaged in repair and maintenance of craft and gear	54,438	5.5

Fishing craft

The census reveals that 22,484 craft of over 20 feet in length were actively engaged in fishing or transport of fish from 1 October 1947 to 30 September 1948; the official registry shows 32,921 craft but many of those must have been otherwise employed.

Steam-driven vessels are gradually being replaced or converted; of the remaining fleet of 89 steamers, 86.5 percent were built before 1920, whereas only 30.5 percent of the decked motor fleet were that old. According to the reports 14,167 craft had electric light installed, about 840 had echo sounders, and 259 radiotelephone as of 1 october 1948. Since the date of the census, however, developments in these fields have been considerable.

The following is a summary of a table giving a breakdown, by size, of the decked fishing craft:

Length of Hull			*Number of Craft*	*Percent*
(Norwegian feet)	*(English feet)*	*(Meters)*		
20– 29	20.6– 30	6.26– 9.10	2,291	20.8
30– 39	31 – 40	9.41–12.24	3,802	34.6
40– 49	41 – 50.4	12.55–15.37	2,587	23.5
50– 59	51.4– 60.6	15.69–18.51	1,118	10.2
60– 79	61.6– 81.2	18.82–25.79	780	7.1
80– 99	82.2–101.7	25.10–31.06	202	1.8
100–119	102.8–122.2	31.37–37.34	138	1.3
120	123.3	37.65	73	0.7
		Total	10,991	100.0

The previous summary can be broken down according to construction period for hull as follows :

When Built	Number of Craft	Percent
Before 1910	1,048	9.5
1910-1920	2,353	21.4
1920-1929	1,811	16.5
1930-1939	3,410	31.0
1940-1944	1,003	9.1
1945-1948	1,040	9.5
Year not known	326	3.0
Total	10,991	100.0

The value, given for 22,101 of the 22,484 Norwegian craft, amounted to 306.4 million Norwegian Kroner.

Total debit was 97 million Norwegian Kroner or 31.7 per cent of the value ; this included mortgages, 86.3 million Norwegian Kroner, and other debits, 10.7. Maintenance costs for almost all craft (19.523) during the period 1 October 1947 — 30 September 1948 amounted to 34.4 million Norwegian Kroner. The owners indicated that conversion or various repair work had been planned for 7,959 craft at a total estimated cost of 102.3 million Norwegian Kroner, of which 77.2 million Norwegian Kroner had to be borrowed.

G. M. G.

NEW MARINE RESEARGH INSTITUTE FOUNDED AT WOODS HOLE

A new marine research institute was formed at Hatchville, near Woods Hole, Massachusetts, U.S.A., an area already famous for its marine laboratories. The new institute, named the *Marine and Fisheries Engineering Research Institute*, was incorporated as a nonprofit organization and was founded to fill a gap between the marine research performed by scientific organizations and the practical engineering aspects required by the fishing industry and other industries with marine problems.

Columbus O'D. Iselin, senior oceanographer and former director of the Woods Hole Oceanographic Institution, was named president of the new organization, while Mr. Francis Minot, Maritime Consultant of Cotuit, Mass., became vice-president and director.

The Marine and Fisheries Engineering Research Institute will " promote the advancement of the fishing industry ; oceanography and other marine sciences and industries ; and the exploitation of the food and other resources of the oceans and other bodies of water ".

This will be done through research, and the development and testing of tools and techniques, including but not limited to vessels, propulsion systems, equipment, fishing gear, fishing and marine planting methods, and marine life.

The particular emphasis of the research program is upon the engineering of specific ship design types and equipment for the greatest efficiency in the commercial fisheries. It is felt that in order to increase the efficiency and scope of the fisheries, fishing vessels should be designed, constructed, and equipped so that they will produce more fish at less cost than conventional designs, equipment, and methods.

E. H.

NEW ZEALAND OCEANOGRAPHIC COMMITTEE ESTABLISHED[1]

Under the auspices of the New Zealand Council of Scientific and Industrial Research, a New Zealand Oceanographic Committee has been set up on which all oceanographic interests in New Zealand are represented, the committee comprising representatives of the universities, museums, Marine Department, Portobello Marine Research Station, Navy, Meteorological Office and the Department of Scientific and Industrial Research. The functions of the Committee have been laid down as the co-ordination of oceanographic work in New Zealand and the sponsoring of research projects, including publication of results. The Committee will act as the national organization through which overseas institutions and international bodies can make contacts with New Zealand workers. The chairman is Mr. A. W. B. Powell, of the Auckland Institute and Museum. The formation of this new body goes back to late in 1949, when the surveying ship H.M.N.Z.S. *Lachlan* commenced operations in New Zealand waters, and the necessity for co-ordinating collection work made from the ship resulted in the formation of an interdepartmental committee to handle samples collected and ensure their distribution to workers in various fields. After some six months of operation it was decided to press for the setting-up of a national organization, and the New Zealand Oceanographic Committee came into existance on October 12, 1950. Sub-committees have since been set up to deal with collecting by the *Lachlan* staff and with physical oceanography. A survey of all oceanography work in hand at the moment is being carried out. The address of the secretary of the Committee is the Department of Scientific and Industrial Research, Wellington, New Zealand.

[1] *Nature*, Vol. 167, 7 April 1951, pp. 547-48. Published by MacMillan & Co. Ltd., St. Martin's St., London, W.C. 2., England.

DEVELOPMENT COMMITTEE ESTABLISHED FOR THE PROVINCE OF NEWFOUNDLAND, CANADA[1]

The Newfoundland Government, following consultations with the Federal Canadian Department of Fisheries, announced on January 27, 1951 the creation of a Fisheries Development Committee which would begin work without delay to formulate a development program for the inshore and offshore fisheries of Newfoundland. The full terms of reference of the Committee are as follows : (1) to examine into the fisheries resources available to Newfoundland with a view towards the fullest utilization of known resources and the discovery and development of others ; (2) to examine into the economics of existing methods of fishing and other methods which may be applicable ; (3) to examine into the economics of existing methods of processing and other methods which may be applicable.

G. M. G.

Conferences and Meetings

THIRD MEETING OF THE INDO-PACIFIC FISHERIES COUNCIL

THE INDO-PACIFIC FISHERIES COUNCIL (IPFC) held the third of its regular annual meetings at Madras, 1-16 February 1951, under the Chairmanship of Dr. J. D. Hardenberg of Djakarta, Indonesia, and with Dr. D. V. Villadolid of Manila, Philippines, as Vice-Chairman. The IPFC, established under the auspices of FAO and financially and otherwise assisted by FAO, is an advisory and consultative body consisting of sixteen member nations interested in the development of the fisheries in the Indo-Pacific region.

The principal function of the Council is to bring about the development and proper utilization of the aquatic living resources of the Indo-Pacific region by providing a means whereby the Member Countries may assist one another in their fisheries programs by exchanging information, proffering advice, integrating projects, and adopting standardization of methods and nomenclature. For the discharge of this function the Council works primarily through its annual meetings at which Member Countries are generally represented by technically

[1] *Trade News*, Vol. 3, No. 7, P. 1, Fisheries Department, Ottawa, Canada, January 1951.

qualified persons. During such meetings the Council reviews the fisheries programs of the region as presented in technical papers brought by delegations, working papers prepared by the secretariat, and verbal communications made during the Council's discussions.

The work of the Council is facilitated by sub-committees selected from amongst its membership which cover subject matters in the various sections of its field of interest, for example sub-committees on Tuna Fisheries ; Neritic Pelagic Fisheries ; Fish Culture ; Planktology ; Hydrology ; Taxonomy ; and Seaweeds. These committees formulate problems, assemble existing information, make surveys, point to gaps in knowledge, and suggest co-ordinating action. On the basis of discussions of the reports of these committees and upon information as to what is being done by its member countries, the Council may recommend action to member governments, make proposals to individual institutions or workers or draw the attention of the Director-General of FAO to situations in serving the fisheries of the region that may require consideration

The program of work of the committees which is set by the Council is kept in motion by an Executive Committee which keeps in close touch with the whole program.

It will thus be seen that the Council's function is to undertake fisheries work conducted by its member countries and that its effectiveness will be largely determined by the degree to which each of the separate national fisheries programs are added to by participation in the Council's meetings, and in the continuing work and contact between its meetings.

At the meeting held in Madras, the Council dealt with an agenda which was composed of several essential procedural items, and which surveyed the whole field of fisheries work in this region. The Council received a long series of technical papers contributing material on almost every aspect of the subject and it seemed that the Council was nearing the end of a preliminary stage of its history in which it has been taking stock of the situation within the region. It can be seen from the long list of resolutions, numbering more than 30, that the Council has begun to be an effective body for the discharge of its essential functions. In certain fields the Council has proposed the continuation of a program of survey to be conducted by its Sub-committee of Fisheries Phenomena ; in certain fields such a project can be more clearly cut than in others. Thus, in the field of gear survey, the Council was presented with a logical system of classification of fishing gear and methods, constructed on sound taxonomic principles. Whilst there was some discussion of the question of how far such a method might be carried, the Council has appointed a group of workers to prepare a catalogue of fishing gears and methods employing whatever system of classification the workers might regard as best. Again, the Council has developed plans for catalogues of fishing craft and of processing methods. In other fields the formulation of projects may not be so simple ; for this reason the Council has proposed different types of action. Primarily the Council has drawn the attention of the member governments to the fact that, in order to enable it to discharge its function of co-ordinating programs of re-

search and development, it must be kept informed of these programs, and in several fields it has specifically asked member governments to provide the information on these. Among these may be mentioned Planktology, Algology, and General Fisheries Biology. In respect of certain problems, it is possible to be quite specific, as, for instance, in respect of the Hilsa fisheries of India, Pakistan, and Burma. Whilst requesting the compilations of information on work relating to this fishery, the Council has proposed to member governments some immediate work, the results of which would furnish the data necessary as a basis for the development of a co-ordinated program. The Hilsa stocks are of particular interest in view of the fact that they are shared by adjoining countries and it is obvious that Governments may, by integration of their research, confer greater efficiency on the programs and at the same time effect economy in expenditures and technical manpower. If these plans are put into effect their results should be shared by these countries in developing the proper utilization of these resources for their mutual interest. Several other major problems of the fisheries of the region received similar specific attention.

For the year 1951-52 the Council selected Dr. D. V. Villadolid of Manila and Mr. R. Serene, Nha-Trang, Indochina, as Chairman and Vice-Chairman respectively.

The next meeting of the Council is scheduled to be held in Manila, October 1952, at the invitation of the Government of the Philippines Republic.

G. L. K.

Fisheries Division Activities

MEETING ON FISHERIES STATISTICS

An International Meeting on Fisheries Statistics is being convened by FAO in Rome, 29 October—3 November 1951. The FAO Conference has consistently recognized fisheries statistics as a prerequisite for policy making in the fields of fisheries production and trade ; the task of compiling, collating and publishing fisheries statistics was among the first projects undertaken by the Fisheries Division. Two yearbooks of fisheries statistics have been issued and a considerable amount of statistics has been published, both in specialized commodity studies and in the Fisheries Bulletin. These publications have been prepared on the basis of information contained in official publications, supplemented by information secured from countries through questionnaires and correspondence, and by visiting FAO officials.

The stage has now been reached where further progress will be impeded unless representatives of member countries discover the means of obtaining more comparable national statistics and for keeping these up to date. It is planned that the meeting will be conducted on the technical level and it is expected that delegates will consist mainly of government officials or others actually in charge of fisheries statistics in the respective countries. The meeting will consider the need for statistics from several angles, trade, research, government regulations, as well as the most effective ways in which to meet the need. Moreover, the need for international comparability and future improvement of fisheries statistics will be considered, keeping in mind the national peculiarities in methods of collecting basic data and the need for retaining such flexibility. Several fisheries statisticians are being asked to contribute to the meeting by presenting papers on specific subjects in co-operation with the FAO Secretariat. Finally, the work which FAO has been doing so far in the fields of fisheries statistics will be examined with the purpose of keeping it up to date and improving its technical details. The draft agenda includes a general statement characterizing fisheries statistics now available ; present and future role of fisheries statistics as experienced by individual countries ; and problems involved in statistics on fishing equipment and personnel, fish catches and landings, domestic and external trade in fisheries products, processing industries, prices, fish consumption, investment, cost and efficiency ; possibilities for measurement of contribution to national income ; problems related to conversion factors and terminology ; and the use of estimates and sample surveys in fisheries matters.

PROPOSED REGIONAL FISHERIES COUNCIL FOR LATIN AMERICA

At the kind invitation of the Government of *Peru*, a meeting to consider the establishment of a Regional Fisheries Council for Latin America will be held in Lima, Peru, 17-22 September 1951. The establishment of a Latin-American Regional Fisheries Council has been repeatedly recommended by the FAO Conference and by the Second Latin-American Regional Meeting on Food and Agricultural Programs and Outlook, held in Montevideo, Uruguay, December 1950 (see FAO Fisheries Bulletin, Volume 4, Number 1-2, pp. 41-43).

Dr. B. F. Osorio-Tafall, Fao Regional Fisheries Officer for Latin America, who is in charge of arrangements for the meeting, will, immediately following the meeting, transfer to his new station in Santiago, Chile. Here, in addition to his duties as Fisheries Officer, he will be the Director-General's Regional Representative for Western South America.

REPORT ON HERRING TECHNOLOGY MEETING

Great interest has been shown in the technical papers presented at the Herring Technology Meeting held in Bergen, *Norway*, in September 1950 and a wide distribution of the mimeographed papers has already been made. A complete collection of the papers is being edited and will be published later this year ; additional information obtained

from discussions during the meeting will be included. Attempts are being made to give the report a handbook-like form by placing this additional information immediately after the various sections to which it pertains. The report, which will be provided with a catchword index, is expected to be about 350 pages in length. Mr. Mog. Kondrup of the Danish Refrigeration Research Institute has been engaged temporarily to assist in the editing work.

REGIONAL FISHERIES OFFICER FOR ASIA AND THE FAR EAST

Dr. G. L. Kesteven, Regional Fisheries Officer for Asia and the Far East, visited Headquarters in May. The program of the Fisheries Division in the area, both the regular FAO work and the Expanded Technical Assistance Program, was reviewed and plans were made for increasing activities in the coming year. Special attention was given the Indo-Pacific Fisheries Council's recommendations for fisheries training schools and plans were made for the establishment of several schools under the Expanded Technical Assistance Program. Arrangements were made for greater participation by the Headquarters staff in the work of the technical Committee of the IPFC. Within the next few months a fisheries technologist and a fisheries economist will be sent to the region for special assignments.

EXPANDED TECHNICAL ASSISTANCE PROGRAMS

The Haitian fish culture project (See FAO Fisheries Bulletin, Vol. 4, No. 1-2, pp. 31-32) is progressing. Three small experimental ponds and two nursery ponds have been constructed. Two large ponds of 1,200 and 2,000 square meters are under construction ; others will be built during the next few months. Through the co-operation of the United States Fish and Wildlife Service, a supply of carp fingerlings, a species exotic to Haiti, was sent by air in February by the FWS Fish Culture Station at Marian, Alabama. They were planted in several of the experimental ponds and are growing satisfactorily. Efforts are being made to secure from Jamaica a trial shipment of *Tilapia mossambica*, a fish which was introduced into Jamaica from Malaya and which seems to have established itself in the island.

Six fisheries agreements have been signed under the Expanded Technical Assistance Program. These are with Pakistan, Chile, Ecuador, Brazil, Ceylon, and Thailand. They provide for various types of assistance from FAO such as developing a fish harbor in Karachi, biological and economic studies of the fisheries in Chile and Ecuador, a reconnaissance survey of the fisheries in Brazil, improvement of fishing methods in Ceylon, and extension of pond culture in Thailand. Recruitment of experts to handle these projects is in progress.

A request was made at FAO's Second Latin-American Regional Meeting on Programs and Outlook held at Montevideo, Uruguay, for the organization of a fisheries training center in South America. The center, which is now being organized, will be conducted at the Santa María Technical University, Valparaíso, Chile, from 6 January to

20 March 1952, and will be open to some 50 students from government and industry in South American countries. The course will include instruction in fisheries biology, technology, economics and administration. A draft curriculum for the school has been prepared and lecturers are being recruited.

At the request of the Government of Turkey, a preliminary survey will be made in July 1951 of the fisheries industry of that country to determine what types of technical assistance are needed to organize and expand the industry.

APPOINTMENT OF FISH CULTURIST

We are pleased to announce that Mr. W. H. Schuster, Fisheries Officer with the inland Fishery Research Station, Indonesia, has accepted an appointment as fisheries biologist and will take up his duties with FAO at the end of July. Mr. Schuster is well known for his fish culture work, particularly his work in the Far East, and his book, *De visculturur in de kustv ijfers op Java* (Fish culture in salt-water ponds in Java). He is chairman of the Fish Culture Subcommittee of the Indo-Pacific Fisheries Council. Mr. Schuster is well qualified for his new duties as supervisor of FAO's expanding fish culture program.

Notes on Publications

NOTES ON PUBLICATIONS are presented in a form similar to that used by FAO *World Fisheries Abstracts*; those readers who wish to cut out and interfile the notes with the WFA cards will find that the classification and subject heading systems are the same. An explanation of these systems, instructions for filing, a detailed list of the Universal Decimal Classification code numbers, and an alphabetical list of the subject headings are contained in the *Handbook for World Fisheries Abstracts*, now available in English, Spanish, and French.

FWS 9.2 FISHERIES STATISTICS – SCOTLAND UDC 31:639.2 (411)

Scottish Home Department. *Report on the Fisheries of Scotland, 1949.* 1950 Cmd. 7979, H.M. Stationery Office, Edinburgh, Scotland. 68 pp., illus., appendices. In English. Price 1s. 9d. net.

Surveys the various Scottish fisheries of 1949 and comments, with statistical tables, on the fishing fleet, persons engaged in the fisheries, the herring fisheries (fishing grounds, landings, processing exports, etc.), the trawl-line and net fisheries, by-products, enforcement of legal provisions, scientific investigations and harbor works and schemes.

L. P. D. G.

FWS 9.2 FISHERIES STATISTICS – ENGLAND UDC 31:639.2 (42)

United Kingdom, Ministry of Agriculture and Fisheries. *Sea Fisheries Statistical Tables, 1949*. H.M. Stationery Office, London, England. 1950 29 pp. In English. Price 9d net.

This annual report presents the 1949 statistical data on fish of British and foreign capture landed in England and Wales. Tables show the quantity and value of landings by species, fishing harbours, and methods of capture (steam and motor trawlers, Danish seiners, line fishing craft, etc.); the number of fishermen and fishing craft engaged; and the quantities and values of imports and exports of fish commodities by countries of consignment.

L.P.D.G.

FWS 9.2 FISHERIES STATISTICS – SWEDEN UDC 31:639.2 (485)

Sweden, Statistika Centralbyran. *Fiske, Ar 1948* (Fisheries in 1948). 1950 Sveriges Officiella Statistik. Stockholm, Sweden. vii + 36 pp. In Swedish with French summary.

The text, which includes tabular presentations of statistical data in summary form, comments on the 1948 marine fisheries industries, the fishermen, craft, gear, quantities and value of landings with separate sections for the various sectors of the coast as well as the processing activities. A short survey of the fresh-water fisheries is given. The text is followed by detailed tables on the number of fishermen, gear, craft, and the quantities and values of landings by region and principal species, as well as statistics on specific fisheries.

L.P.D.G.

FWS 9.2 FISHERIES STATISTICS – BELGIUM UDC 31:639.2 (492)

Belgium, Nationale Federatie van het Visserijbedrif, de Vishandel en de 1950? Visnijverheid. *Jaarverslag over het Dienstjaar 1949* (Annual Report for the year 1949). Drukkerij Unitas, Ostende, Belgium. 39 pp. In Flemish.

The activities of the National Federation of the Fishing Industry and Trade of Belgium is surveyed in the light of the various economic features (fleet, landings, the over-fishing problem, prices, consumption, external trade, etc.). The activities of the Federation are mentioned in paragraphs on taxation, regulation of the shotten herring season 1949-50, propaganda for fish consumption, import duties, exports, exchange difficulties, statistics, etc. A statistical supplement covers the fleet, landings by species for 1938, 1947, 1948 and 1949, landings by month for 1949, and external trade in fisheries products.

L.P.D.G.

FWS 9.2 FISHERIES STATISTICS – U.S.A. UDC 31:639.2 (73:798:969)

Anderson A. W. and Power, E. A. *Fishery Statistics of the United States, 1947*. Statistical Digest No. 21. United States Department of the Interior, Fish and Wildlife Service. U.S. Government Printing Office, Washington, D. C., U.S.A. 285 pp. In English. Price $1.00. 1950

Detailed statistical data for 1947 on the marine and inland fisheries industries of the continental United States, Alaska, and Hawaii. The subject matter covered is similar to that in Statistical Digest No. 19 for 1946, mentioned in the *FAO Fisheries Bulletin*, Vol. 3, No. 4, p. 92, July-August 1950.

L.P.D.G.

FWS 2.11 FISHING BOATS – NORWAY UDC 31:639.2.06 (481)

Norway, Fiskeridirektøren. *Register over Merkepliktige Norske Fiskefar-*
1950 *koster* (Registry of Norwegian Fishing Craft 1950). A/S Lunde & Co., Bergen, Norway. xvi + 854 + 23 pp. In Norwegian.

The 1950 registry follows the pattern of previous issues, the latest being 1948. Brought up to date to 15 August 1950, it covers 33,578 Norwegian fishing craft. In addition to information previously given on each craft identification number, name, principal employment, construction material, construction year for hull and engine, length of hull, beam, depth, make of engine and horsepower, it gives gross register tonnage.

G.M.G.

FWS 9.2 FISHING COST NORWAY UDC 338.58 : 639.2 (481)

Mietle, Per L. *Lønnsomhetsundersøkelser 1949 basert på fiskefarkoster*
1950 *årsdrift* (Cost investigations, 1949, based on fishing craft's annual accounts). Fiskeridirektoratets Småskrifter No. 12-1950. Fiskeridirektøren, Bergen, Norway. 39 pp. In Norwegian.

This pamphlet, which originally appeared as an article in *Fiskets Gang*, gives the main results of cost investigations conducted jointly by the Norwegian Fishermen's Union (Norges Fiskarlags) and the Norwegian Directorate of Fisheries. It is based on extract accounts from 131 craft submitted on a special form. The form follows the usual procedure for computing, on a lay or percentage basis, the expenditure for fishermen's pay, craft, and gear. A fairly detailed account of seasonal and annual (overhead) costs is given.

G.M.G.

FWS 9.2 FISHERY PRODUCTS, CONSUMPTION – GERMANY UDC 339.4:639.2 (43)

Institut für Demoskopie, Gesellschaft zum Studium der Oeffentlichen
1950? Meinung M.B.H. *Der Fischkonsum in Westdeutschland* (Fish Consumption in Western Germany). Seeweg 7, Allensbach am Bodensee, Germany. 48 pp. In German.

This study by the Institute for Demoscopy, Society for the Study of Public Opinion, was undertaken on behalf of the Central Administrative Office for the fisheries industry, (Food, Agriculture and Forest Administration), Hamburg, in May and June 1949. It presents statistically the data obtained as answers given by housewives to questions on supplies, prices, and kinds of fish, in addition to a textual analysis of the results. It was translated into English and mimeographed by the Translation Unit, Economic Cooperation Administration, Office of Special Representative, Paris, France.

L.P.D.G.

FWS 9.2 FISHERY PRODUCTS, CONSUMPTION – NORWAY UDC 339.4:639.2 (481)

Norway, Opplysningsutvalget for Fisk. *Fiskeforbruk i Oslo* (Fish Con-
1949 sumption in Oslo). Oslo, Norway. 34 pp. In Norwegian.

Gives a summary report on the results of an inquiry among Oslo housewives undertaken in June 1949 at the instance of the Fish Information Committee (Opplysningsutvalget for Fisk), a government-sponsored and -supported committee.

G.M.G.

FWS 9.2 FISHERY PRODUCTS, CONSUMPTION – CANADA UDC 339.4:639.2 (71)

Van Vliet, W., and Snaith, W. E. *Regional Consumption of Fish in Ca-*
1949 *nada.* Economics Division, Department of Fisheries, Ottawa, Canada, March 1949. iv + 67 pp., appendices. Mimeographed. In English.

Gives statistical material obtained by an attempt to measure the consumption of the principal fish species and commodities in various parts of Canada. It also indicates the relationships (level of consumption, influence of the fish producing regions, the importance of the major species and commodities, etc.) that exist between the various consuming regions and points out the principal factors causing differences in consumption between these regions.

L.P.D.G.

FWS 9.4 CONGRESSES AND CONVENTIONS UDC 341.18

Indo-Pacific Fisheries Council. *Proceedings – 2nd Meeting, 17th-28th April,*
1950- 1950, *Cronulla, N.S.W., Australia.* Section I, II,III. Bangkok,
1951 Thailand, Nov. 1950, Jan. 1951.

Section I reports the Proceedings proper and action taken, and gives reports of various Committees. Section II consists of selected technical papers presented at the Meeting on hydrology, planktology, biology, gear, and food technology. Section III is devoted to the symposium on estuarine environment, on which subject papers were submitted by D. J. Rochford (Australia), N. K. Panikkar (India), J.D.F. Hardenberg (Indonesia), and D.W. Le Mare (United Kingdom).

A distribution of the Proceedings has been made by the Fisheries Division of the FAO Regional Office for Asia and the Far East, Bankgok, Thailand. Although copies are no longer available for individuals, most of the leading fisheries institutions, establishments, and departments in the Indo-Pacific area and elsewhere have been supplied with a copy which will be available to staff members.

G.L.K.

FWS 9.11 OCEAN UDC 551.46

Italy, Consiglio delle Ricerche. *Bibliographia Oceanographica, 1946* (Oceano-
1950 graphic Literature, 1946), Vol. 19. Piazzale delle Scienze 7, Rome, Italy. 123 pp. In Italian.

Lists most of the contributions to the science of the sea and related fields for 1946. 1147 entries from 212 periodic publications are listed, many of them with short summaries. Section 14 (pp. 98-113) deals with fisheries (entries Nos. 948 to 1147).

B.F.O.T.

FWS 9.12 MARINE BIOLOGY UDC 592

Miller, Roy Waldo. *Field Book of Seashore Life.* G.P. Putnam's Sons,
1950 New York, N. Y., U.S.A. xv + 888 pp., illus., bibl. In English.

Adapted not only for beginners and amateurs but also for students, teachers, and research workers, this compact manual is a handy reference book that permits a rapid tentative identification of the more common marine invertebrates of the Atlantic Coast of the United States. The illustrations of more than 1300 species described in the text and pictured in 250 full page plates of line drawings and 24 color plates contribute large-

ly to these objectives. The use of technical names is kept at a minimum and so facilitates the study of seashore life by the layman. Each one of the 14 phyla described is preceded by an introduction explaining its chief distinctive characteristics, morphology and anatomy, habits, classification, etc. A list of selected references and an index form an appendix.

B.F.O.T.

FWS 1.3 SALMONS, ETC. UDC 597.5

Jones, J. W. *Salmon Studies.* Fishery Investigations, Series 1, Vol. 5, 1950 No. 2. United Kingdom Ministry of Agriculture and Fisheries, London, England. 23 pp., 16 tables. In English. Price 1s. 6d. net.

Part I of this report analyses data relating to scales of unspawned adult salmon, salmon smolts, and sex condition of salmon parr and smolts from the Hampshire Avon and Itchen rivers collected in the period 1934-1940. Part II discusses results of investigations in the salmon of the Cumberland Derwent river from 1936 through 1949.

B.F.O.T.

FWS 1.1 TUNAS – MACKERELS, ETC. UDC 597.5

Lozano, Fernando. *Nota sobre el Bonito del Norte o Albacora (Germo* 1950 *alalunga (Gml.) de Galicia* (Note on Northern Bonito or Albacore of Galicia). Boletín del Instituto de Oceanografía, No. 36. Madrid, Spain. 13 pp. In Spanish.

Biometric study of 50 specimens of albacore from the northwest of Spain with data on sex, sexual condition, food, fishery season, and volume of the catch.

B.F.O.T.

FWS 1.2 HERRINGS, ETC. UDC 597.5

Navaz, J. M. and Navarro, F. *Nuevos datos sobre la Sardina y la An-*
1950 *choa de la Costa Vasca* (New data on the Sardine and Anchovy from the Basque Coast). Boletín del Instituto Espanol de Oceanografía, No. 32. Madrid, Spain. 8 pp., illus. In Spanish.

Fernandez, R. and Navarro, F. *Observaciones sobre la Sardina de*
1950 *Santander* (Observation on the Santander Sardine). Ibid, No. 33. 7 pp. In Spanish.

Bardan, E. and Navarro, F. *Nuevos datos sobre la Sardina de Malaga*
1950 (New data on the Malaga Sardine). Ibid, No. 34. 4 pp. In Spanish.

Massuti, M., Valls, T. and Navarro, F. *Nuevas Observaciones sobre la Sar-*
1950 *dina y la Anchoa de Baleares* (New Observations on the Sardine and Anchovy of the Balearic Islands). Ibid, No. 35. 7 pp. In Spanish.

Results of the investigations conducted on the sardine and anchovy from the Cantabric and the sardine and sardinella from the Mediterranean. Data analysed correspond to small populations from the 1948-49 fishing season covering size and weight, sexual conditions, fatness and vertebral formula.

B.F.O.T.

FWS 2.11 NAVAL ARCHITECTURE UDC 621.12

Japan. government Fisheries Agency. *Technical Report of Fishing Boat*
1950(?) *Research*. Tokyo (?), Japan. 97 pp. In Japanese with English summary.

A fishing boat research organization, the Fishing Boat Laboratory of the Fisheries Agency, was set up in 1948. The Laboratory carries out basic practical experiments and investigations on fishing boats and urgent problems of the fishing industry. In this first report, the director of the Fisheries Agency, T. Iiyama, wrote the introduction, and the chief of the fishing boat section of the Fisheries Agency, Atsushi Takagi, described the research program and its progress. The technical papers deal with work on a torsion dynamometer for determining the shaft horse power of fishing boats during trials, study of improved insultation of fish holds, study of the fishing boat engine problems, and two studies on fishing boat compasses.

J.O.T.

FWS 2.115 NAVAL ARCHITECTURE UDC 629.12

Handbuch der Werften 1950 (The Shipyard's Handbook 1950). Schiffarts-
1950 Verlag "Hansa," C. Schroedter & Co., Hamburg 11, Germany. 272 pp. text, illus. In German. Price DM 15.

The first edition of a yearly textbook of principles of naval architecture, has chapters on ship designing, resistance and propulsion, stability and trim, design regulations, strength of ships, welding, light alloys, steam engines, Diesel motors and auxiliary machineries, all by different German authors. One chapter is devoted to *Form and resistance of fishing boats*, which gives a review of Heckscher's paper *Resistance values for bigger fish cutters* (Widerstandswerte von Fischkutterformen grosseren Typs). Includes plans of some newly built ships, e.g. the 59 m. (194 ft.) trawler *Otto Schubert*, and a 21 m. (69 ft.) fishing boat, as well as a list of German ship and boatyards.

J.O.T.

FWS 9.6 FISHERIES INDUSTRIES UDC 639.2

Tysser, Harry F., editor. *World Fisheries Year-book 1950*. British-Con-
1950 tinental Trade Press Ltd., 222 Strand, London, England. 520 pp., illus. In English. Price US$4.00.

Contains signed and unsigned articles on fisheries in different countries of the world, in addition to articles on freezing, fish varieties on the markets, value of fish to human health, fish cooking, sales promotion, fisheries research, echo sounders, fish oil technology vessel construction, transportation of fish etc. Lists of fisheries trade groups are given.

J.O.T.

FWS 2.12 FISHING, EXPERIMENTAL UDC 639.2.001.5

Postel, E. *Campagne du chalutier 'Gerard-Treca', avril-septembre* 1949
1950(?) (Operations of the Trawler *Gerard-Treca*, April-September 1949). Gouvernement Général de l'Afrique Occidentale Française, Inspection générale de l'élevage, Dakar, French West Africa. 37 pp., illus., maps.

A well-illustrated report of research of trawling possibilities, the location and quantity of commercial fishes, and fishing at depths of 25-150 meters between St. Louis and the Saloum. The author gives some indications of the price of fish landed at Dakar. Fishing charts are inserted after the next.

J.C.

FWS 1 FISHERIES RESEARCH – CANADA UDC 639.2.001.5 (71)

Fisheries Research Board of Canada. *List of Publications of the Fisheries*
1950 *Research Board of Canada* (formerly the *Biological Board of Canada*) *1901-1949*. Bulletin No. 87. Fisheries Research Board of Canada, West Block, Ottawa, Ontario, Canada. 96 pp.

Lists in numerical order publications issued by the Board from its inception to the end of 1949. At present these publications report the work done at the seven research stations maintained by the Board. Covers the Journal of the Fisheries Research Board, formerly entitled, Contributions to Canadian Biology, Contributions to Canadian Biology and Fisheries, and Journal of the Biological Board. Annual Reports, Progress Reports, and Bulletins of the Board, Canadian Atlantic Fauna, and Canadian Pacific Fauna are also listed. Newfoundland Publications including Annual Reports of the Fishery Research Commission and Fishery Research Laboratory, Research Bulletins, and Service Bulletins are also covered. Space for additional titles is left at the end of each section.

A.M.S.

FWS 2.14 DETECTION OF FISH – ECHO SOUNDING UDC 639.2.081.72

Hodgson, W. C. *Echo Sounding and the Pelagic Fisheries*. Fishery
1950 Investigations, Series II, Vol. 17, No. 4. United Kingdom Ministry of Agriculture and Fisheries. His Majesty's Stationery Office, York House, Kingsway, London W. C. 2, England. 26 pp., illus., bibl. In English. Price 3s net.

Gives a short review of the history of echo sounding since 1928 when ultra-sonic transmitters were first used, and lists reasons which may cause unsatisfactory recordings. Reproductions of echo charts showing the presence of pilchards, herrings, sprat, mackerel, coalfish and pollack are given and explained. Some examples of unidentified charts are also given and commented upon.

J.O.T.

FWS 1.2 FISHING – HERRINGS, ETC. – SARDINES UDC 639.222.5

California Department of Natural Resources, Marine Research Committee.
1950 *California Cooperative Sardine Research Program, Progress Report* 1950. Pier 47, Foot of Jones Street, San Francisco 11, California, U.S.A. 54 pp., illus. In English.

This report is one of the first to present an over-all picture of the program on the California Cooperative Sardine Research Program which was founded in 1947 by the California Academy of Sciences, the California Division of Fish and Game, the University of California, the Scripps Institution of Oceanography, and the U.S. Fish and Wildlife Service. Describes methods of work, research vessels, stations, and the instruments used. Reviews the work accomplished so far, e.g. studies on the sardine's environment, the physical, chemical, and biological oceanography, work on other fishes, the 1950 surveys of the young sardine, and the continuing studies as well as the plans for 1951. Many illustrations and diagrams show the equipment used and the results obtained.

J.O.T.

FWS 2.11 FISHING BOATS UDC 639.279

White, E.W. 1950 *British Fishing-Boats and Coastal Craft.* Part I. Historical survey. Ministry of Education, Science Museum. His Majesty's Stationery Office, York House, Kingsway, London, W.C. 2, England. 54 pp., illus. In English. Price : 2s. net.

A historical review, including 20 plates of different types of fishing boats from the British Isles, which is based on the collections of models at the Science Museum, South Kensington, London, England. A second part will serve as a descriptive catalogue of the collections of models.

J.O.T.

FWS 9.16 FISHERIES MANAGEMENT – FRESH WATERS UDC 639.31

Wolf, Ph. 1950 *Fiskeribiologiska Undersökningar i Kávlingeån* (Fisheries Biological Investigations in the Kavlinge River). Sveska Lax-och Laxöring-föreningen u.p.a. Malmö. C.W.K. Gleerup, Lund, Sweden. 72 pp., illus. In Swedish and English.

Describes the activities of the Swedish Salmon and Trout Association in restocking salmon and sea-trout in the Kavlinge River in Skania in order to show that making full use of this body of water for fish production is a profitable undertaking. The present report deals with some of the biological investigations made during 1947 and 1948. Among the topics discussed are experiments in planting brown trout and salmon in the upper reaches of the Bra River, the descent of the salmon and sea trout parr in the Kavlinge river system, and stunning and killing of fish by chemicals.

B.F.O.T.

FWS 6.13 REDUCTION OF FISHERY PRODUCTS – FISH – HERRINGS UDC 664.957.1 665.2.213.03

Sildolje- or Sildemelindustriens Forskningsinstitutt. 1950 *Årsberetning* (Annual Report), *1949-1950.* J.W. Eides Boktrykkeri, Bergen. 16 pp. In Norwegian.

Gives the organization and activities of the Norwegian Herring Oil and Meal Industry Research Institute. Covers its research on utilization of stick water, methods of cooking herring, storing conditions and the effect of preserving compounds on the raw material ; the effect of storing oil ; and chick feeding tests.

E.H.